A REVISION OF THE NORTH AMERICAN TWO-WINGED FLIES OF THE FAMILY THEREVIDAE.

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INTRODUCTION.

This study of the Therevidae was a part of some graduate work done at Stanford University, beginning in the autumn of 1919. While at Washington, District of Columbia, a few years ago the writer made some notes on the types in the United States National Museum collection and named a personal collection of Therevidae by comparison. It is to be regretted that no further reference to types (with a few exceptions) has been possible during the preparation of this paper. But most of the species are so well marked as to be easily identified from the descriptions, and authentically determined material from other dipterists has aided considerably. Possibly a few mistakes have been made due to not having seen all type material, but as there was no opportunity of doing this in the near future it seemed best to publish the results of this study at this time, rather than wait a number of years and delay progress on the work done in this family of diptera.

Of the 82 previously described species the writer has examined 50 during the progress of the work, 3 of this number being types. The 32 species not available for study are largely uniques, and the types of a number are in Europe. The types of 9 of these rare species are in the United States National Museum, and the writer made notes on some of them when studying that material some years ago. Nine of the 32 species not examined are Mexican, but they may be taken in States along the border by future collectors. The writer collected 22 species in addition to new forms, 15 of these in the type localities. Over 1,200 specimens were examined from various parts of North America, a collection extensive enough to give some idea of the species occurring in this region.

The location of the types of new species is designated under the specific descriptions. The type material belonging to the writer has been placed in the United States National Museum, which also contains by original deposit or subsequent purchase nearly all of Kröber's types. The names of the collectors are given in parentheses and the

location of the material in brackets. In the listing of specimens abbreviations are used for the names of institutions which have furnished material: M. C. Z. = Museum of Comparative Zoology, Cambridge, Massachusetts; A. N. S. P. = Academy of Natural Sciences of Philadelphia; Canad. coll. = National Canadian collection at Ottawa; Harrisb. coll. = Department of Agriculture, Harrisburg, Pennsylvania; Amer. Mus. = American Museum of Natural History, New York City; B. S. N. H. = Boston Society of Natural History.

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HISTORY OF CLASSIFICATION OF FAMILY.

In the year 1796 Latreille established the genus *Thereva*.[1] The flies of this genus were, previous to this, placed in the old genus *Bibio* of Fabricius and *Musca* Linnaeus. In 1838 Zetterstedt founded the genus *Psilocephala* and about two years later Macquart and Wiedemann described a number of species in the family. In 1874

[1] Précis des Caractères génériques des Insectes, etc.

Loew published on the Therevidae of Europe and made some interesting observations on the genus *Thereva*.

Osten Sacken's Catalogue of the North American Diptera, published in 1878, listed 4 genera and 43 species in the family, counting Walker's 6 species, which were listed in a footnote, with the observation that most of them would coincide with Say's or Loew's species, the others being unrecognizable from the descriptions. Four of the specific names used in this catalogue have been relegated to synonymy and two are described from Cuba and are not included in the list later given by Aldrich.

In 1893 Coquillett wrote a synopsis of the genera *Thereva* and *Psilocephala* and in 1894 a short revision of the family. He described a large number of species but made no extensive study of the family. In 1912 Kröber published his Revision of the Therevidae of North America, and, having a good general knowledge of the group, his paper was a valuable contribution to the knowledge of the family. The work is incomplete, due in part to the lack of material for study, and many species are included in the tables from reading the descriptions. Some of the new species are based on one or two specimens, often only one sex being described, and as no figures are given there may be some difficulty in separating the species from closely allied forms, even though the descriptions are usually quite complete. Kröber had a tendency to "lump" species that were superficially alike, judging from the material in the collection of the United States National Museum that was sent to him for determination. Under *Psilocephala haemorrhoidalis* there were found no less than seven distinct species, all allied to *haemorrhoidalis*, but clearly different when carefully examined. Kröber's work on the Therevidae of the world, published as one of the parts of the Genera Insectorum in 1913, is of great assistance to students of the group; in this monograph he recognizes 442 species, grouped in 38 genera.[2]

Aldrich (1905), in his Catalogue of North American Diptera, gives 6 genera and 71 species in the Therevidae. In his revision of the North American species Kröber lists 9 genera and 81 species. The writer has erected 4 new genera and has described 38 new species in the following pages, making a total of 13 genera and 118 species, and there is little doubt that many more species will be added during the next few years.

STRUCTURAL CHARACTERS.

In general appearance the Therevidae are somewhat like the more weakly bristled robber flies which are placed in the subfamily Dasy-

[2] After completing this manuscript the writer obtained a copy of Kröber's paper (Beiheft zum Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten) published in 1914. Critical remarks and diagnoses of species have been added in the galley proof. One new genus and fifteen new species are described from North America.

pogoninae, but they are, as a rule, less heavily built, have weaker legs, fewer bristles, and a differently shaped head; the eyes never bulge out conspicuously from the vertex and are usually contiguous in the males. The venation easily distinguishes the Therevidae from the Bombyliidae and the Apioceridae, the latter differing also in the form of the palpi. Most of the species are small or moderate in size, but usually over 5 mm. in length. The antennae are three-jointed and the radius is furcate; thus they belong to the first group of the Orthorrhapha Brachycera, the Tromoptera, or fourth superfamily. The abdomen is usually more or less conical, the general color gray or brown, and in many species densely covered with pile. The males are usually more pilose than the females, and in some species they are silvery pollinose. There are no North American species with a metallic coloration.

The head is usually hemispherical, the occiput distinct, the eyes large and in most genera the males have the facets on the upper portion noticeably larger, often with a more or less distinct line of division between the small and large facets. The eyes are bare and usually holoptic, or nearly so, in the male. In a few genera the eyes are separated in the male by the width of the ocelli, as in the foreign genera *Neothereva*, *Platycarenum*, and *Ectinorrhynchus*, and the American genera *Tabuda*, *Metaphragma*, *Henicomyia*, and *Nebritus*. One species of *Psilocephala* described in this paper, *latifrons*, has the eyes thus widely separated, and might be placed by some dipterists in a new genus. The eyes of the female are always widely separated. Some species have the eyes colored or marked with a purple crossband. There are three ocelli on the small ocellar tubercle. Most of the species have distinct orbital or post-ocular bristles.

The writer has not followed Peterson in naming some of the sclerites of the head. The term "vertex" as used by Peterson applies to the space between the eyes from the top of the head to the cheeks. It has been the custom of dipterists to limit the term "vertex" to the region of the ocelli, the part from the vertex to the base of the antennae being called the front or frons, that from the base of the antennae to the genae the face. The frons in the Therevidae is usually flat or slightly convex, never excavated as in the Asilidae, and may be wholly pollinose, shining, or marked with characteristic spots and lines. The face is short and often receding and may be bare or pilose. The cheeks are usually quite narrow.

The antennae are porrect, of medium or large size, situated in the middle of the head in profile, or a little below the middle, and are often on a protuberance; they are usually close together at the base. In most species the first antennal joint is cylindrical and rather long, but often greatly swollen; in *Euphycus* it is longer than the head. The second joint is shortest and usually rounded and with very short

bristles. The third joint is quite varied, in some short and broad, usually as long as the first, in *Henicomyia* five times as long; in *Ozodiceromyia* it appears ringed and spinose. In the genus *Dialineura* and in certain species of *Psilocephala* the third joint is quite short, often with a more or less distinct basal annulation. The antennal style or arista is usually two-jointed and is more or less variable in shape, usually apical, but in some cases subapical or dorsal. In the genus *Henicomyia* there is apparently no style present. Coquillett and Kröber both overlooked the fact that there is a distinct style on the third antennal joint of *Nebritus* (a genus with one species); the style is not at the extreme apex of the third joint, but in a shallow dorsal pit a short distance from the tip. In the new genus *Epomyia* there is an approach to this form of antenna.

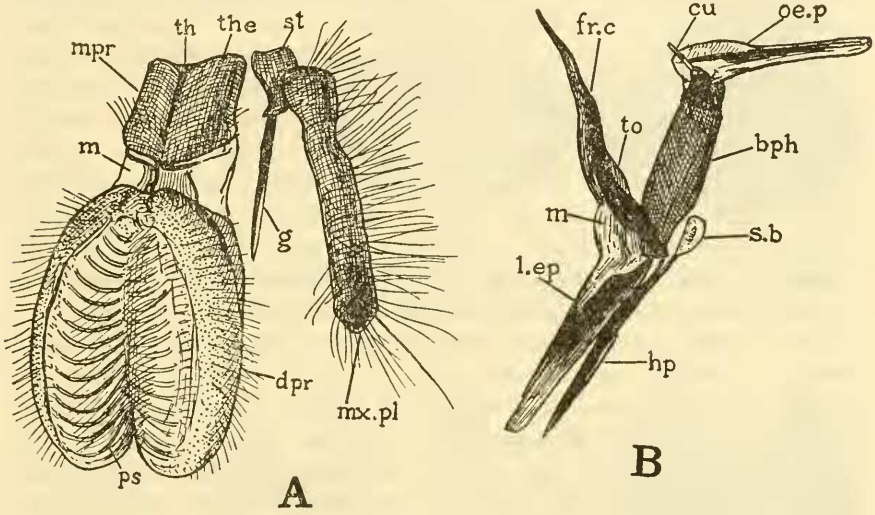


FIG. 1.—MOUTH PARTS OF DIALINEURA CRASSICORNIS WILLISTON. *A*. OUTER MOUTH PARTS (DISTIPROBOSCIS AND MEDIPROBOSCIS, WITH PALPI AND GALEA). *B*. INNER MOUTH PARTS (HYPOPHARYNX, EPIPHARYNX, BASIPHARYNX, OESOPHAGAL PUMP, ETC.). *m*, MEMBRANE; *mpr*, MEDIPROBOSCIS; *th*, THICKENING; *the*, THECA; *ps*, PSEUDOTRACHEA: *dpr*, DISTIPROBOSCIS; *g*, GALEA; *st*, STIPES: *mx. pl.*, MAXILLARY PALPUS; *fr. c.*, FRONTO-CLYPEUS; *cu*, CORNU; *oe. p*, FSOPHAGAL PUMP; *to*, TORMA; *bph*, BASIPHARYNX; *s. b.*, SALIVARY BULB; *l. ep*, LABRUM EPIPHARYNX; *hp*, HYPOPHARYNX.

The mouth opening is comparatively small and the proboscis and palpi small as a rule, but in *Psilocephala* the mouth parts are rather large. The mouth parts consist of the usually broad, fleshy, bilobed distiproboscis (see fig. 1*A*), which is grooved on the underside. Above this is a narrow chitinized connection surrounded by a membrane and the mediproboscis with a median thickening. The well developed, one-jointed maxillary palpi are connected with the proboscis, being fastened to the stipites, which in turn are fastened to the mediproboscis. The galea, not present in some families of the diptera, is narrow and needlelike. The mouth structure facing the

buccal cavity (see fig. 1*B*) consists of the hypopharynx, the epipharynx, a membraneous area in posterior continuation of and rising above the epipharynx, and a small salivary bulb behind and fastened to the hypopharynx. Almost at right angles to the hypopharynx is the frontoclypeus, and leading back to the esophagal pump is the heavily chitinized basipharynx. At the top of the basipharynx on each side is a small appendage called the cornu. In none of the North American genera do we find the proboscis noticeably protruding (the foreign *Acupalpa* has needlelike mouthparts). The palpi are longer haired in *Psilocephala* than in most of the other genera and in *Henicomyia* are very peculiar in shape.

The thorax is of moderate size, the dorsum long oval and with hairs and bristles; the bristles are quite uniform in general arrangement, but are apparently of no systematic importance, owing to the variation being mostly individual and not specific. There are from two to six praesutural, usually two supraalar, one postalar and one or two pairs of praescutellar bristles. In the new genus *Caenotus* there are no distinct thoracic bristles. The mesonotum is usually more or less pollinose and often with longitudinal vittae; in the males the mesonotum is usually densely pilose, but in some forms almost bare in both sexes. The scutellum is medium sized and usually semicircular, with two to four apical bristles; it is like the thorax in color as a rule. The squamae are small and the halteres are quite large; in *Furcifera* the squamae are hairy.

The abdomen varies somewhat in general form, but is usually conical, especially in the male; in some of the foreign genera the abdomen is more or less modified in shape. The males of some genera have a silvery shimmer to the pollen on the tergites and the females often have silvery spots or bands. The abdomen in the male is usually much more pilose than in the female. As in many of the Asilidae, the female has a terminal circlet of spines on the last segment; this is lacking in the new genus *Pherocera* and in the foreign *Oldenbergia*. The male hypopygium is not very large in the majority of species and the genitalia have not been made use of in the past in the classification of the group, but they possess specific differences which are of great importance. The typical genitalia are shown in text figures 2 and 3. Crampton in a recent article[3] has worked out the homology of the genitalia of several orders of insects, including the diptera, and the writer has followed this interpretation of the different parts. In the Therevidae there are two plates forming the hypandrium, which is usually smaller than the upper covering of the genitalia; this upper portion is composed of the ninth and tenth segments combined and is called the epiproct. The general form of the genitalia is alike in all the North American genera.

[3] Psyche, vol. 27, pp. 34 to 44.

In all the species the proctiger is a separate plate, considered an eleventh segment by some morphologists, and has two narrow flaps above; these flaps are in some cases quite conspicuous. There is some variation in the form of the aedeagus and good specific char-

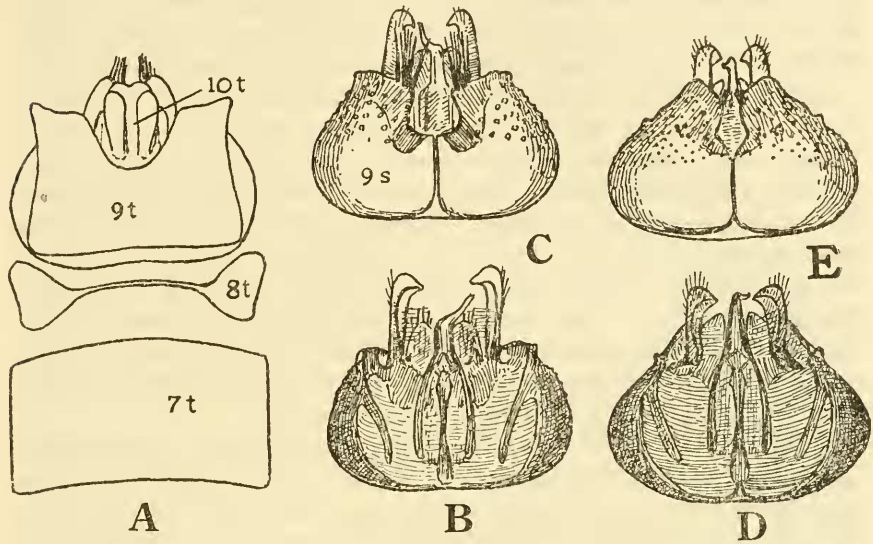


FIG. 2.—MALE GENITALIA. *A*. DORSAL VIEW OF APEX OF ABDOMEN OF PSILOCEPHALA FRONTALIS. *B*. INTERNAL GENITAL ORGANS OF SAME. *C*. NINTH STERNITE OF P. FRONTILIS. *D*. INTERNAL GENITAL ORGANS OF PSILOCEPHALA HAEMORRHOIDALIS. *E*. NINTH STERNITE OF P. HAEMORRHOIDALIS.

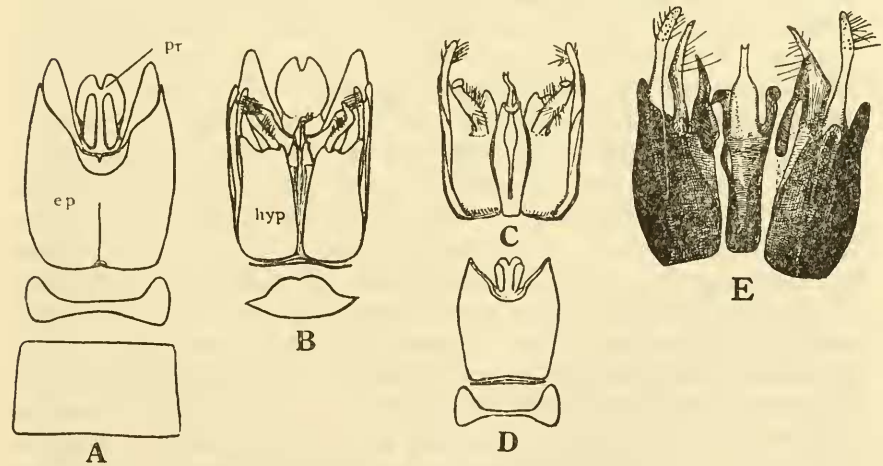


FIG. 3.—MALE GENITALIA. *A*. APICAL SEGMENTS OF DIALINEURA CRASSICORNIS. *B*. VENTRAL VIEW OF SAME. *C*. INTERNAL GENITAL ORGANS OF D. CRASSICORNIS. *D*. DORSAL VIEW OF MALE GENITALIA OF THEREVA VIALIS. *E*. INTERNAL GENITALIA OF SAME, HIGHER MAGNIFICATION.

acters may be found in this portion of the genitalia and in the gonopods (styles and lobes) attached to the hypandrium. These characters have been used very little in this paper, but ultimately

they will be used more in the classification of the species, as they have been used in other groups of the diptera.

The legs of most of the species are long and not very heavy, the hind legs longer than the others. The anterior coxae have two (or more) bristles in front near the tip, the hind coxae have one bristle outside near the middle and two similar or smaller ones in front near the tip. The femora may be bare or with one or several bristles; the hind femora usually have a row of anteroventral bristles. There is often long pile on the femora, especially in the male. The front tibiae usually have two or three rows of small bristles, the hind tibiae often as many as four rows, and there are about six bristles in the circlet at the apex of the tibiae. As a rule the tarsi are slender, with short apical spines, the posterior tarsi with short plantar bristles on the basal joint. There are two small pulvilli (absent in the foreign *Caenophanomyia*). The empodia are wanting, or represented by a bristle, thus distinguishing the species from the Rhagionidae. The arrangement of the bristles on the legs is not very constant but may, when studied carefully, furnish specific characters.

There is a remarkable uniformity in the wing venation, the general plan being the same throughout the family, the new genus *Caenotus* showing the greatest departure from the normal type. In this paper the Comstock system will be used in place of the older Schinerian system, and the modification of it used by Williston and adopted by most of the dipterists in this country. In the Therevidae, R–4 and R–5 fork some distance from the end of the wing and the upper fork is noticeably curved in some of the genera, including *Psilocephala* and *Thereva*. The vein R–5 always ends in the wing margin, except in *Xestomyza*, where the lower fork drops down to the vein M–1. In *Metaphragma* there is a spurious cross vein connecting R–5 and M–1 beyond the furcation of Rs. The cell M–3 is open or closed, there being a certain amount of individual variation here, but the character usually holds for the species. The cell first A (anal cell) is always long and closed near or in the margin; cell R is longer than second M. Although the genera *Henicomyia* and *Nebritus* are quite aberrant in some respects they have a normal venation. In the genus *Pherocera* M–2 does not reach the wing margin and Cu–1 and M–3 coalesce far before the wing margin and stop short of it; in some specimens M–2 reaches the wing margin and in some it does not; also there seems to be a tendency for M–2 to branch near M–1 and for an extra cross vein to form. Abnormalities of venation are not infrequent. There is in many species a semicircular cloud at the outer side of cell first M–2 (discal cell), called a "Bogenwisch" by Kröber; an apical spot is also present in some, the cross veins are clouded in many, and there may be spots and bands on the wing, or a general infuscation. *Metaphragma* is the only genus having a supernumerary cross vein between

R–5 and M–1 (in the first posterior cell). There is usually a well-developed stigma, often quite thick and very prominent when the wing is hyaline. In the new genus *Caenotus* there is a great coalescence of veins; in *C. minutus* there is no m–cu cross vein or cell M–3 and Cu merges with M–3 in one vein, forming the bottom of cell first M–2 (discal cell); thus there are four veins from the cell. In the Therevidae only the alar pair of squamae are more or less developed, and these are folded so as to give the appearance of two pairs.

HABITS OF THE ADULT THEREVIDAE.

The habits of the adults are not well known. Some of the species have been reported as predaceous. Many years ago Schiner spoke of the adults as "robber flies" which have a somewhat cunning and uneasy catlike demeanor, lurking between the leaves of low shrubs and being able to conceal themselves quickly. Verrall never observed them preying on other insects in England, and Professor Poulton was not able to obtain any records for his paper on the predatory diptera. The writer has observed several species carefully and has never seen them catch other insects. Williston stated that the adults fed on small diptera, lying in wait for them on the ground or upon the leaves of trees and bushes. If they are predators they are feebly organized for such a mode of life. They are usually less active than the Asilidae, this being especially true of the females, and the proboscis has a fleshy labella which would make it impossible for them to kill any of the larger or more heavily chitinized insects. As a rule one does not have to watch a predaceous insect very long before seeing some evidence of its habits.

The imagines have been reported in large numbers around certain plants and many species are said to seek certain blossoms, the flowers of *Rubus* and *Crataegus* furnishing good collecting in parts of England. The writer has taken species of *Psilocephala* and *Thereva* while sweeping alfalfa plants during the summer months and large numbers of a new species of *Psilocephala* were taken about strawberry plants in June, in the Hood River Valley of Oregon.

The flight of some species of Therevidae is quite quick, but for only short distances and in some species hoplike. *Thereva pygmaea* is very quick on the wing. Undoubtedly the weather has a great deal to do with the activity of the flies, and specimens taken toward evening are apt to be slow in their movements, but the imagines of *Metaphragma planiceps* appeared to be sluggish when observed about midday. Some species taken along stream banks appear to keep rather close to the water, crawling about among grass stems, over drift trash, or sunning themselves on rocks and patches of sand. Many species are found not far from running streams, but others occur

in arid regions and on sand dunes where there is little or no vegetation.

The writer had the opportunity of observing the imagines of *Dialineura crassicornis* in the Hood River Valley of Oregon and in the vicinity of Stanford University, California. This species is found on rocks and sand along stream beds where the country is open and sunny. In the vicinity of Stanford the adult flies were first noticed on April 27 in 1920, all the specimens observed on that date being males; these males were very alert and would not allow a near approach until they became accustomed to one's presence. They would stand on the rocks and sand with the front legs almost straight, the front end of the body thus being tipped up. Now and then one would fly up suddenly some 5 or 10 feet in the air and two or three others would start in pursuit. They were evidently awaiting the appearance of a female and would fly up after small pebbles tossed in the air near them, reaching the pebble before it started to fall and pursuing it to the ground in many instances. They would continue this game as long as one cared to throw for them and seemed to catch sight of the object some 10 feet away. Perhaps the larger facets on the upper part of the eye of the male permit an unusual vision. On a near approach to the object thrown in the air the flies would sense their mistake and return to the ground. None of them were seen feeding on other insects. The females were observed about a week later than the males and were much less active, none of them paying any attention to objects thrown near them, or to other insects flying over, as in the case of the males. Most specimens kept in captivity lived only two or three days, but two females, fed on sugar water, lived about eight days.

Adults of *Thereva vialis* were observed in the same localities with *D. crassicornis* and their habits were much the same. They appeared to emerge a little later and had a longer season. They lived no longer in captivity than the other species and no eggs were obtained from either.

EARLY STAGES OF THE THEREVIDAE.

Very little is known of the early stages of these flies or their habits, nothing being known of the egg stages. Zetterstedt, in a paper published many years ago, recorded one species of *Thereva* ovipositing in sand. The older larvae of several species are known and have been found to have various habits. They have been found in earth and decaying wood, feeding upon decaying vegetable or animal matter. Some specimens have been found singly under moss, fir needles, cow dung, fungus, decaying wood, especially alder branches. The larvae are predaceous and even cannibalistic. Westwood found *Thereva* larvae in pupae of *Aleucis pictaria* and *Sphinx ligastri* and the larvae

of *Psilocephala eximia* in *Noctua*. Bergenstamm found the larvae in decaying oak wood in which the larvae of *Adelocera* lived.

Collinge has described the early stages of *Thereva nobilitata* from England [4] and expresses the opinion that all of the species have more or less economic importance in the larval state. The larvae move like an eel or snake, not being able to draw themselves together as most other dipterous larva do. Collinge noted that the larvae preferred compact but sandy soils, making use of earthworm burrows when in wet soil and forming small side chambers along them. He found larvae at the roots of currant trees and some at the roots of pinks and violets. These larvae were fed on the larvae of *Ceutorrhynchus sulcicollis*, also on fly larvae and small earthworms. The pupae were found on the surface of the soil or only partially covered by it.

Hyslop described the larva and pupa of *Thereva egressa* Coquillett and the feeding habits [5] from observations taken at Pullman, Washington. The larva was found in a wheat field in May, and when taken it had its head and first four anterior segments inside of an elaterid larva and was feeding on the viscera. The larva was fed on one or two elaterid larvae every day until June 10, when it pupated. From the description the larva is the typical of the family. The length at first was 25 mm. and 30 mm. just before pupating, with the thoracic segments much swollen. The pupa is evidently much like some of those in the genus *Psilocephala*, the length being given as 15 mm. The pupal stage in this case lasted 14 days.

Hyslop also reared *Psilocephala aldrichi* Coquillett and *P. munda* Coquillett from larvae taken in the field, associated with elaterid larvae and probably predaceous on them.

DESCRIPTIONS OF THE LARVAE AND PUPAE.

The larvae of the Therevidae are quite long and slender, cylindrical, chitinized, tapering at the two ends; the head small, heavily chitinized, and darker in color than the rest of the body; the mandibles well developed and pointed apically; antennae quite small. The prothoracic spiracle is distinct and there is a bristlelike hair on the side of each thoracic segment near the middle. The abdominal segments 1 to 6 are divided by constrictions so that there appear to be 20 segments in all. The anterior spiracles are on the segment behind the head, the posterior spiracles on the antepenultimate segment; the last segment ends in two short fingerlike processes.

The pupae are distinguished from those of the Asilidae by the presence of two horns (antennal sheaths) on the head, pointing outward, and a tubercle with a curved spine near the base of each wing

[4] Journ. Econ. Biol., vol. 4, pp. 14–19.
[5] Proc. Ent. Soc. Wash., vol. 12, p. 98, 1910.

sheath. The thorax is rather heavy. Each abdominal segment has a circlet of bristles or thorns which are directed backward; the spiracles are situated on the proturberances along the anterolateral line and there are spines around them; the apical segment ends in two long slender thorns which are touching at the base, or in what might be termed a bifid spine.

The writer had the opportunity of examining the early stages of *Psilocephala frontalis*, new species, *P. haemorrhoidalis* Macquart, *P. argentifrons*, new species, and *P. limata* Coquillett. Descriptions of these are given following the account of the adults and they are illustrated on the plate 13.

GEOGRAPHICAL DISTRIBUTION.

Counting the species described in the present paper, there are 496 species and 43 genera in the Therevidae. Only *Thereva* and *Psilocephala* are spread over practically all countries, the other genera having a more or less limited distribution. Kröber lists 9 genera as Palearctic only, 11 as Indo-Australian only, 4 as North American only, 2 peculiar to Africa, and 1 to South America. To the peculiarly North American genera must be added the new genera described in the following pages: *Caenotus*, *Chromolepida*, and *Pherocera*. As in other groups, we find the simultaneous appearance of the same or allied genera in Australia, South America, and South Africa.

No European species are known from North America at the present time; the European species *Thereva annulata* Fabricius is very close to *Thereva vialis* Osten Sacken, the male being scarcely distinguishable, but Maj. E. E. Austin has kindly compared the two species and has found the females to be quite distinct, although closely allied. We know scarcely anything of the Mexican species or of those from Central America; Bellardi and Bigot described a few species and later Osten Sacken and Williston, but their material was very meager.

Most of the Therevidae do not penetrate far into northern latitudes, as they are flies that prefer bright sunshine, but a few species go north into Canada and some appear to be truly Boreal in their distribution. Some species of *Psilocephala* have a rather wide distribution in this country, but most are local and only a few Boreal species are known to occur clear across the continent. *Psilocephala aldrichi* has been recorded from the east to the west coast, but the eastern and western forms are quite distinct species. *Thereva brunnea*, new species, *T. senex*, *T. albifrons*, and *T. frontalis* are Boreal species and *Psilocephala munda* appears to be confined to northern latitudes or to high altitudes and occurs from the east to the west coast, as does *Thereva frontalis*. *Psilocephala haemorrhoidalis* and *P. frontalis*, new species, are two common eastern species which are so nearly alike that

they have been confused; the latter species is described in the present paper and has spread farther west and north than *haemorrhoidalis*, all the Canadian specimens examined belonging to this species.

The genus *Henicomyia* is undoubtedly Mexican in its origin; probably the same is true of the new genera *Caenotus* and *Pherocera* and the genera *Euphycus*, *Ozodiceromyia*, and *Furcifera*. The genus *Chromolepida* is known from two species, one occurring in Nicaragua and the other in central California; the two species are very nearly alike and the Central American form was described by Coquillett as a species of *Psilocephala*. *Metaphragma* is represented by one species which occurs all along the Pacific coast and the one known species of *Nebritus* is reported only from California.

GEOLOGICAL DISTRIBUTION.

Several species of Therevidae have been described from fossil remains in Europe, three species having been described from Baltic amber by Loew. The specimens described have been assigned to the lower Oligocene, upper Oligocene, and upper Miocene. Scudder[6] mentioned a series of specimens taken at Florissant, Colorado, but did not describe any of the species. They were taken together with a number of Asilidae and many of the specimens were in good condition.

In 1909 Cockerell described two species from the Miocene shales of Florissant, *Psilocephala scudderi* and *P. hypogaea*, which are referred to in the bibliography. Both species seem to be quite closely allied to modern species of the genus *Psilocephala*. In the Proceedings of the United States National Museum (vol. 57, p. 251, 1920) Cockerell describes a new genus and species, *Eothereva simplex*, from Eocene rocks. This fly is described as similar to *Thereva*, but with very long antennae, the second joint longer than the other two together, and the third longitudinal vein of the wing simple. The discal cell is described as small and narrow, the anterior cross vein equally distant from its base and apex, the anal cell probably open, perhaps widely so. The species is 6 mm. in length, of which 3.4 mm. is abdomen; the wings about 5.5 mm. and reddish hyaline. The body as preserved is described as pale reddish.

TABLE OF GENERA.[7]

1. Thorax and abdomen largely clothed with scales, many of which ars iridescent; face below the antennae with two shining callosities; antennae long, slender, short bristled, and with a small subapical style.... **Chromolepida**, new genus.
   Body with a tomentumlike pile, but never with scales; face without shining tubercles; third antennal joint with a style (except in *Henicomyia*)..... 2.
2. First antennal joint longer than the head and well developed..... 3.
   First antennal joint at most as long as the head, usually much shorter..... 4.

[6] Bull. U. S. Geol. Surv. Terr., vol. 6, p. 291, 1881.

[7] The genus *Apsilocephala* described in Kröber's 1914 paper is near *Pherocera*, but has very slender wings and no stigma.

3. Third antennal joint long and appearing annulated, the labrum narrow. **Ozodiceromyia** Bigot.
   Third antennal joint not thus, first and second antennal joints with many bristles ..... **Euphycus** Kröber.
4. Small species almost devoid of bristles; vein Cu–1 coalescing with M–3; antennae very short ..... **Caenotus**, new genus.
   Larger species with distinct thoracic and scutellar bristles; venation normal, at least all the cells present ..... 5.
5. Upper face hairy; more or less heavily built species, usually gray or brown pollinose, the males thickly pilose ..... 6.
   Upper face bare; usually more slender, less pollinose and pilose species .... 7.
6. Wing with a cross vein connecting R–5 and M–1 outside the r-m cross vein; first antennal joint large and long bristled; eyes of males separated. **Metaphragma** Coquillett.
   Wing venation normal, the first antennal joint not large and swollen; eyes of males contiguous ..... **Thereva** Zetterstedt.
7. Third antennal joint two and one-half to four times as long as first; slender species, the males dichoptic ..... **Henicomyia** Coquillett.
   Third antennal joint at most two times as long as first; abdomen not very slender and more pilose ..... 8.
8. Face projecting; first antennal joint large and shining, the style small and in a lateral pit some distance from the apex of the third joint. **Nebritus** Coquillett.
   Face not nearly horizontal; first antennal joint pollinose ..... 9.
9. Eyes of male widely separated; first antennal joint about two times as long as the third, swollen, hairy; lower frons with considerable pile. **Tabuda** Walker.
   Eyes of male contiguous or nearly so (except in *Psilocephala latifrons*, new species); lower frons nearly bare of pile ..... 10.
10. First antennal joint as large as in *Tabuda*, the third joint more slender; male abdomen with silvery white pile, the genitalia pollinose. **Dialineura** Rondoni.
    First antennal joint proportionately smaller; male genitalia usually shining; mostly slender species ..... 11.
11. Antennae on a prominent convexity, the style as long as third joint and composed of two almost equal joints and an apical bristle; female genitalia flattened, more or less pointed, with an upper and lower plate and no circlet of bristles; vein Cu–1 and M–3 coalesce and do not reach the wing margin. **Pherocera**, new genus.
    Antennae with a much shorter style, usually only one joint visible; veins Cu–1 and M–3 if coalescing reach the margin of the wing; female genitalia rounded and with a terminal circlet of blunt spines ..... 12.
12. Antennal style near the tip of the third joint, but in a hollow at the side and not apical; wings banded; front tibiae enlarged; frons of female with a single black spot in the middle ..... **Epomyia**, new genus.
    Not with the above assemblage of characters ..... 13.
13. Antennae with a terminal style; front tibiae not enlarged; wings not banded. **Psilocephala** Zetterstedt.
    The style projects from under the tip of the third antennal joint. **Furcifera** Kröber.

CAENOTUS, new genus.

Rather small, dark-colored species with hyaline wings. The genus is not closely related to any other described from North America. The antennae are short, with a very small subapical style and a few

short bristles on the first two joints. The eyes are contiguous in the male and widely separated in the female; in the male the facets on upper two-thirds of the eye are much larger than those on the lower third, the line of demarcation being quite distinct. Frontal triangle in male very small. The eyes run to the bottom of the head, scarcely any cheeks being visible from the side; face small and bare. Proboscis and palpi long pilose. The body in general sparsely pilose, with no distinct spines on the thorax and abdomen, those on the legs being very small and hairlike. Genitalia of male quite prominent and differing from other known genera in general form; the female genitalia much as in *Thereva*, with a terminal circlet of spines. Abdomen of male about twice as long as thorax. Venation quite different from other known genera; vein Cu–1 coalesces with M–3 either at the base, there being no cell M–3 or m–cu cross vein, or there may be a partial coalescence as in *C. inornatus*.

Genotype.—*Caenotus inornatus*, new species.

TABLE OF SPECIES

1. Thorax with sparse erect white pile; vein Cu–1 coalescing with M–3 for most of its length (three veins from the discal cell).....minutus, new species.
2. Thorax with more dense yellowish white pile; slightly larger species; vein Cu–1 and M–3 united for a short distance near the base but ending separately and wide apart in wing margin (four veins from discal cell).

inornatus, new species.

CAENOTUS MINUTUS, new species.

Plate 1, fig. 4.

Male.—Length 4 to 5.5 mm. Head black, including the antennae, the pile white; small frontal triangle gray pollinose. Antennae short, the first joint about twice the length of the second, both with a few short hairs; third joint a little longer than the first two combined and much broader at the base, the apical portion ending in a microscopic bristle. Palpi blackish with long white pile.

Thorax and scutellum opaque black, thinly gray pollinose with sparse erect white pile, not dense enough to obscure the ground color. Pleura thinly gray pollinose with some fine white pile. Knobs of the halteres yellow, the stems yellowish brown.

Abdomen black, thinly gray pollinose with erect white pile, longer on the first four segments, short on the prominent genitalia; the two lateral lobes of the epiproct yellowish on the apical half and prolonged a little beyond the hypandrium. Legs black or blackish brown, knees yellowish; femora gray pollinose; bristles of legs small, fine, pale, hardly noticeable under low magnification. Wings hyaline, the veins brown or yellowish; R–4 nearly straight beyond the fork; Cu–1 coalescent with M–3 for most of its length, there being no m–cu cross vein or cell M–3 (fourth posterior cell); stigma yellowish.

Type locality.—Holotype, a male, taken at Alamogordo, New Mexico, April 26, 1902.

Type.—In the collection of the Philadelphia Academy of Natural Sciences. There are seven paratypes, two deposited in the National Museum, the others in the collection with the types; all were taken in the type locality, April 22 to May 1, 1902.

Paratype.—Male, Cat. No. 25926, U.S.N.M.

CAENOTUS INORNATUS, new species.

Plate 1, figs. 1, 2, and 3.

Male.—Length 5.5 to 6.5 mm. Very nearly like *C. minutus* in general structure, color, and habitus. The pile of the thorax is a little thicker and more yellowish. The yellowish lobes of the genitalia are very much the same. Knees, hind tibiae, except apices, basal portion of two front pairs of tibiae and base of hind metatarsi, yellowish; spines on tibiae stronger than in *C. minutus*. Halteres as in the above species. Wing venation nearly the same as in *C. minutus*, but Cu–1 and M–3 are united for a short distance near the base and end separately and wide apart in the wing margin. There is no m–cu cross vein or cell M–3. (See fig. 2.)

Female.—Length 8.5 mm. Head and thorax colored much as in the male. Head appears proportionately small and is black in ground color and gray pollinose; cheeks show slightly below the eyes. First two joints of antennae short pilose; antennae distinctly separated at the base. Frons pollinose and very short yellowish pilose; a depressed, shining median line from front ocellus to base of antennae; frons narrower at the ocelli, gradually widening below.

Pile of thorax much shorter than in male and more reclinate; pile of scutellum and pleura white and shorter than in male. Abdomen quite large at base and about three times as long as the thorax, the pile short, very sparse, and yellowish. The first three segments almost entirely shining blackish, incisure between second and third white; posterior margins of third and fourth yellowish; fifth, sixth, and seventh segments are largely shining brownish yellow. Venter colored much as the dorsum. Spines of the genitalia yellow. Coxae brown; femora and tibiae brownish yellow, the hind legs paler; tarsi except base of first joint brown, the spines more apparent because of the larger size of the specimen; front and middle tibiae about equal in length, the hind tibiae about half again as long. Wing venation about the same as in the male. In one wing of the type M–2 curves down to meet M–3 and Cu–1 slightly before the wing margin, in the other wing it goes straight out to the margin; the wings are faintly brownish yellow.

Type locality.—Holotype, a male, collected at Alamogordo, New Mexico, May 5, 1902, and allotype, a female, from the same locality, taken May 12, 1902.

Types.—In the collection of the Philadelphia Academy of Natural Sciences.

There are three male paratypes taken at the same locality from May 13 to 15. In these specimens there is a slight variation in the venation; in one wing of one specimen M–2 is reduced to a stump projecting from cell first M–2, in another specimen the vein does not reach the wing margin. One paratype is in the United States National Museum, the others are in the collection with the types.

Paratype.—Male, No. 25927, U.S.N.M.

Genus EUPHYCUS Kröber.

1912. *Euphycus* KRÖBER, Deutsche Ent. Zeitschr., vol. 7, p. 2.

This genus is near *Phycus* Walker. The first antennal joint is long and with bristles, the body thickly pilose and the males and females quite different in appearance. The only known species, *Euphycus setosus*, was described by Kröber. In the female the frons is shining black, the face silvery white.

Type locality.—Mexico.

Type.—In the Vienna Museum.

Genus HENICOMYIA Coquillett.

1898. *Henicomyia* COQUILLETT, Journ. New York Ent. Soc., vol. 6, p. 187.

The antennae are almost as long as the thorax, the third joint two and one-half to four times as long as the first, the second broader than long, the third joint of nearly equal diameter, almost twice as thick as the first, truncated at the tip and destitute of a style. Head nearly twice as broad as long; face bare; palpi as long as the proboscis and two-jointed. Frons of male broad and dull. Abdomen slender, three times as long as thorax. Legs long and almost entirely bare. Wings normal in venation, with one or more brown crossbands.

Genotype.—Henicomyia hubbardi Coquillett.

TABLE OF SPECIES.

1. Third antennal joint about four times as long as first; abdomen almost wholly black; one light brown band on the wing..... hubbardi Coquillett.
2. Third antennal joint about two and one-half times as long as the first; fifth and sixth abdominal segments reddish yellow; two blackish brown bands on wing..... varipes Kröber.

HENICOMYIA HUBBARDI Coquillett.

Plate 2, figs. 5, 6, and 7.

1898. *Henicomyia hubbardi* COQUILLETT, Journ. New York Ent. Soc., vol. 6, p. 187.

This species is easily recognized from Coquillett's description, together with the figures given in this paper.

Type locality.—Fort Grant, Arizona.

Type.—Cat. No. 4071, U.S.N.M.

Distribution.—The single male specimen of this species examined was taken at Garces, Arizona, August, by Mr. Biedermann. This specimen answers the original description very well; it is in the collection of the department of agriculture, Harrisburg, Pennsylvania.

HENICOMYIA VARIPES Kröber.

1912. *Henicomyia varipes* KRÖBER, Stett. Ent. Zeit., p. 213.

In this species the third antennal joint is proportionately shorter than in *H. hubbardi*. The face is described as black, bare; the palpi much as in *H. hubbardi*. The wings are hyaline, with two blackish brown crossbands.

Type locality.—Mexico City, Mexico.

Type.—A unique male in Kröber's collection.

Genus NEBRITUS Coquillett.

1894. *Nebritus* COQUILLET, Journ. New York Ent. Soc., vol. 2, p. 98.

Head flattened, slightly longer than broad, the frons almost horizontal; eyes almost round, the vertical diameter a little greater than the horizontal; eyes of male separated by a space about twice as wide as the ocellar tubercle. First antennal joint very large, almost as long as the head, shining, with strong bristles; second joint very small, the third rather long and slender, but distinctly shorter than the first; second and third joints dull. There is a distinct style on the outside of the third antennal joint situated in a hollow, or groove, about three-fourths the distance from the base (Coquillett and Kröber stated that the style was *wholly wanting!*). Proboscis slender and projecting beyond the prominent frons, the labellae almost as long as the proboscis proper. Palpi shorter than proboscis and subclavate. Face bare and retreating below. Thorax rather flattened, about one-half as long as the abdomen in the male and shorter in proportion in the female. Male genitalia rather small, but distinctly visible under low power, the anal flaps conspicuous. Pulvilli present, the empodia hairlike. Venation normal for the family; cell first M–2 (anal cell) closed, other cells on the wing margin open.

(Name from the Greek *nebritos*, like a fawn skin.)

Genotype.—*Nebritus pellucidus* Coquillett.

NEBRITUS PELLUCIDUS Coquillett.

Plate 3, figs. 8, 9 and 10.

1894. *Nebritus pellucidus* COQUILLETT, Journ. New York Ent. Soc., vol. 2, p. 98.

The original description is quite comprehensive. The length is 7 to 10 mm.

Type locality.—Southern California.

Type.—Female, Cat. No. 10424, U.S.N.M.

From the examination of several perfect specimens the following notes have been added: Proboscis blackish brown; second and third antennal joints velvety black, in two females the first joint entirely yellowish. There is a shining black stripe from the ocellar tubercle to the base of the occiput. The two median yellow vittae of the thorax are narrow, the yellow stripe above the pleural suture thickly covered with yellow tomentumlike pile, which is also present on the sides of the scutellum. The pile on the first four abdominal segments of the female is yellowish, the rest of the abdominal pile black and the circlet of bristles at the tip of the abdomen is black. The male genitalia (see fig. 10) are reddish yellow with long black pile. The male abdomen is yellowish gray pollinose and lacks the black spots present in the female, the posterior margin of the second segment is whitish; all of the dorsum of the abdomen is faintly silvery with short reclinate black pile; the pile on the venter and sides is longer, erect, and whitish; the sides of the abdomen are shining black and there are two shining black stripes on the venter; sixth segment scarcely visible, black pilose. Wing veins heavy and black, with a very faint outline of brown which gives them a heavier appearance; base of the wing yellowish.

Distribution.—All of the known specimens have been collected in California; specimens were examined from the following localities: Claremont (Cole), [Cole]; unknown locality in California (Univ. Minn. coll.); Bryson, May 18, 1920 (E. P. Van Duzee); Keen Camp, Riverside County, June 6 (E. P. Van Duzee), [both Cal. Acad. Sci.].

Genus OZODICEROMYIA Bigot.

1889. *Ozodiceromyia* BIGOT, Ann. Soc. Ent. France, vol. 9, p. 321.

The original description is translated as follows:

Antennae much longer than the head, almost cylindrical, pilose, first segment longer than the head, second small, third equal to the first, with three or four indistinct rings, last segment, pyriform, blunt, the bristles indistinct; labrum narrow, genitalia apically short spinose (female); face bare, fourth posterior cell and anal cell closed before the margin of the wing.

Type.—In the Bigot collection, owned by J. E. Collin, Newmarket, England.

Only one species is known; from Mexico.

OZODICEROMYIA MEXICANA Bigot.

1889. *Ozodiceromyia mexicana* BIGOT, Ann. Soc. Ent. France, vol. 9, p. 321.

Black, hardly shining; thorax narrowly and obscurely bilineate; face and frons ornamented with shining black; halteres and legs rufous; femora, base broadly, apices of tibiae, anterior and middle tarsi infuscated; wings pale smoky, the base and margin yellowish. Length 9 mm.

Type locality.—"Mexico."

A single female specimen in the collection of the American Museum may possibly belong to this genus, and in many characters answers the description given of the species *mexicana*. The antennae are not as described, the first joint being distinctly shorter than the head, but the third is indistinctly annulate (with apparent but not actual segments). It is almost impossible to identify the species from the description given by Bigot, but if the type is still in existence it may some day be redescribed. The definite locality in Mexico where the specimen was collected is not known. The specimen in the American Museum is from the W. M. Wheeler collection and is labeled "Tizapan, D. F."

Type.—In the Bigot collection, now the property of J. E. Collin, Newmarket, England.

PHEROCERA, new genus.

This genus is closely allied to *Rueppellia*, judging from the description and the published figures of that genus. In general appearance it resembles *Psilocephala*. Only females are known, and in these the frons is convex at the antennae and characteristically marked; the cheeks are quite apparent but do not project far below the level of the eyes; the proboscis is like that of *Psilocephala*, the palpi cylindrical and not as long as the proboscis. The antennae are shorter than the head, the first and third joints about equal, the second about one-half as long; the style is slender, cylindrical, about as long as the third joint, and consists of two equal segments and an apical bristle; first two joints bristled below. There are strong spines above the dorso-pleural suture and on the scutellum. The femora are without spines; front tibiae with rather long pile and no spines except at apex. Genitalia of female very peculiar, the internal structure being hidden by the flat dorsal and ventral plates, which have no spines on them. The wing venation is very close to some species of *Psilocephala*, but there is more coalescing of the veins; R–4 is only slightly curved beyond the fork; veins M–3 and Cu–1 meet some distance before the wing margin, and after coalescing do not reach the margin.

Genotype.—*Pherocera signatifrons*, new species.

TABLE OF SPECIES.

1. Two oval black spots on face at base of antennae; upper half of frons gray pollinose ..... signatifrons, new species.
   No black spots on face; upper half of frons shining black ..... 2.
2. Legs black; dorsum of thorax thinly gray pollinose with a median dark stripe and side spots ..... albihalteralis, new species.
   Legs largely reddish yellow; dorsum of thorax shining black with two silvery pollinose vittae ..... flavipes, new species.

PHEROCERA SIGNATIFRONS, new species.

Plate 3, figs. 11, 12, and 13.

Female.—Length 6 mm. General body color blackish brown, with gray or silvery pollinose areas. Frons much wider below than above, the upper half including the ocellar tubercle, gray pollinose; on the lower half of the frons an oval, shining, blackish brown spot, somewhat raised and reaching almost to the eyes on the sides. (See fig. 13.) Face, cheeks, and orbits silvery pollinose, the cheeks and palpi white pilose; palpi brown; proboscis blackish gray pollinose. At the base of each antenna and contiguous to the shining callosity of the frons is an oval black spot. Antennae black, the bristles below black and strong; first antennal joint a little longer than the third and twice as long as the second; style rather slender, two-jointed, and with an apical bristle, the whole about as long as the third joint of the antennae. Occiput gray pollinose with short black bristles above.

Thorax, scutellum, and pleura blackish, the color obscured by the gray pollen; there is a median brown dorsal stripe, widened in front and almost reaching the scutellum; an elongate brown spot on either side of the stripe. Scutellum with short, fine, white pile on the margin and two black bristles. Mesa and meta pleura with some white pile. Knobs of halteres blackish gray pollinose, the stem yellowish. Coxae colored as the pleura and with white pile.

Abdomen blackish, with whitish incisures on segments one to five, very narrow on the fifth; the very fine pile is whitish and reclinate; first segment mostly gray pollinose and a small amount on the posterior margin of the second, the rest semishining. Genitalia very peculiar in shape and with very short black pile; there is an upper and lower triangular plate, flattened and with no circlet of bristles as in most of the other genera. Legs mostly blackish, the femora thinly gray pollinose and white pilose, with no distinct bristles; tibiae more or less yellowish on the basal half, the front pair whitish; all the tibiae white pilose, the front ones with quite a thick covering of silvery white pile, obscuring the ground color from the front. Wings rather small, grayish hyaline, the venation near that of *Psilocephala* (see fig. 12); vein M–2 does not reach the wing margin; vein M–3 coalesces with Cu–1 and does not reach the margin.

Type locality.—Holotype, female, Alamogordo, New Mexico, May 5, 1902.

Type.—In the Philadelphia Academy of Natural Sciences.

There are four female paratypes in the collection of the Philadelphia Academy of Natural Sciences, collected at the same time and place, and one paratype in the National Museum. This species and the following are in a group having no near relatives north of the Mexican border; its origin is probably Central or South American.

The only known species of *Rueppellia*, which occurs in Egypt and Abyssinia, has a venation very nearly like that of the species of *Pherocera*, but the wing is shorter and broader according to the figure given by Verrall in British Diptera; the antennae also have a three-jointed style.

Paratype.—Female, No. 25928, U.S.N.M.

PHEROCERA ALBIHALTERALIS, new species.

Plate 3, fig. 14.

Female.—Length 5.5 mm. Closely resembling *P. signatifrons*, the antennae being very nearly the same. Most of the frons, including the ocellar tubercle, shining black, flat; the narrow margins and the face silvery pollinose. Proboscis black, palpi brownish yellow, white pilose.

Thorax black, the dorsum thinly gray pollinose, with a faint darker median stripe and two side spots. Scutellum with narrow shining black base, the rest whitish pollinose, with two black bristles. Pleura and coxae largely silvery gray pollinose, knobs of the halteres ivory white, stems brown.

Abdomen brownish black, semishining; faint traces of gray pollen on the first two segments and basal half of the venter; the short, sparse pile whitish and reclinate; narrow posterior margins of first three segments whitish. Genitalia of nearly the same structure as in *signatifrons*, with very short black pile. Legs black with black bristles, basal half of front tibiae whitish, the brown of the apex extending up some distance on the underside. Wings hyaline, the venation almost the same as in *signatifrons* (most of one wing broken off); stigma pale brown.

Type locality.—Alamogordo, New Mexico, June 6, 1902.

Type.—Female, in the Philadelphia Academy of Natural Sciences.

Only one specimen of this species is known. It is easily distinguished from *signatifrons* by the color of the halteres and the marking of the frons, and from *flavipes* by the general coloration.

PHEROCERA FLAVIPES, new species.

Plate 3, fig. 15.

Female.—Length 5 mm. Very much like the other two species of the genus in general appearance. General color black, with gray or silvery pollen and white, short, sparse pile. Frons shining black, narrow margins, and the face silvery pollinose; antennae apparently like those of the above-described species (the third joint broken off from one and the style from the other antenna).

Dorsum of the thorax shining black, with two widely separated silvery pollinose vittae, the posterior half largely silvery gray polli-

nose. Base of scutellum narrowly shining black, most of disk silvery white pollinose, the margin dull black with two bristles. Pleura and coxae silvery gray pollinose. Knobs of halteres white, the stems pale brownish.

Abdomen shining black, first segment gray pollinose, the rest shining; the short pile reclinate and whitish; pile on the last two segments black. Genitalia the same as in the other two species of the genus. Second and third abdominal segments with narrow posterior margins of white. Coxae partly yellowish, femora yellowish, the two front pair brown above; tibiae reddish yellow, white pilose, the tarsi blackish; front tibiae largely whitish yellow, with dense silvery white pile in front. Wing venation the same as in the other two species; vein M–2 reaches the margin of the wing in the single specimen.

Type locality.—Holotype, female, collected at Highley, Arizona, June 13, 1917, on Superstition Mountain (E. G. Holt).

Type.—In the collection of the United States Biological Survey.

The unique type is closely related to the other two species of the genus, but is distinguished by the marking of the thorax, the yellow femora, etc.

CHROMOLEPIDA, new genus.

Small species, very near *Psilocephala* in general appearance. Antennae long and slender, the first joint longer than the second and third, and with no distinct bristles, but short hairs. The orbital bristles are very short and set back from the vertex so that only a few show from the front. Eyes holoptic in the male and widely separated in the female. On the upper face just below the antennae are two shining black callosities. Cheeks projecting below the eyes more than is usual in *Psilocephala;* the palpi and proboscis are much the same. Mesonotum, pleura, and coxae more or less clothed with scales, many of which are iridescent; in perfect specimens there is a dense covering. This vestiture is not found in any other genus in the family. Abdomen of the male as in *Psilocephala,* but with scales on the dorsum, venter, and sides in addition to the pile; in the female there are very few scales. The male genitalia are of the general type found in *Thereva* and *Psilocephala,* as are the female genitalia. The wings are rather short, unusually short in proportion to the body in the female.

Genotype.—*Psilocephala pruinosa* Coquillett.

TABLE OF SPECIES.

First two antennal joints yellow; frons without a velvet black spot.
pruinosa (Coquillett).

First two antennal joints black; frons with a velvet black spot near the middle.
bella, new species.

CHROMOLEPIDA PRUINOSA (Coquillett.)

1904. *Psilocephala pruinosa* COQUILLETT, Proc. Ent. Soc. Wash., vol. 6, p. 91.

The original description, from a male specimen, is recognizable. There is a male of this species, evidently a paratype, in the Stanford University collection, taken at Managua, Nicaragua (C. F. Baker). The specimen is labeled "*Psilocephala pruinosa* n. sp., det. Coq."

Type locality.—Granada, Nicaragua.

Type.—Male, No. 7795, U.S.N.M.

In the specimen examined the thorax is very thinly gray pollinose and very few of the characteristic scales remain, the specimen being somewhat rubbed. The trochanters are brown and the coxae black; some of the scales of the pleura and coxae are quite large and iridescent; the pile is sparse and whitish. Before the scutellum the scales are much smaller and yellowish. The scales of the dorsum of the abdomen are slender and silvery white.

CHROMOLEPIDA BELLA, new species.

Plate 3, figs. 16, 17, and 18.

Male.—Length 5.5 mm. Head black, the upper half of the eyes with much larger facets than the lower (a more marked difference than in *Thereva* and *Psilocephala*); two narrow blue stripes across the middle of each eye. Face with two shining black callosities below the antennae as in *C. pruinosa*, whitish pollinose around the callosities; callosity above the antennae shining black. Pile of cheeks and occiput white; antennae black, the first joint a little longer than the second and third combined, slender, cylindrical (see fig. 17); the first two joints with short black pile, a few more bristlelike at the apex of the first joint; a very small subapical style on the third joint. Middle of frontal triangle with a velvet black crossband, above and at sides whitish pollinose.

Thorax black, thinly gray pollinose, thickly clothed with yellowish white scales above and iridescent ones on the sides and pleura; the pile very sparse and white. Coxae and trochanters black, the coxae with iridescent scales. Halteres yellow, the base of the stem brown. Scutellum gray pollinose, with four bristles.

Abdomen black above, the last three segments and genitalia largely reddish yellow; pile of abdomen white, yellowish on the genitalia; upper lamellae of genitalia large. Dorsum of abdomen whitish pruinose and with silvery white tomentum; venter reddish yellow, with pale pile and yellowish scales. Femora, tibiae except apex and base of tarsi yellowish, the rest of the legs black. Femora with only a few short bristles below, three to six on the hind ones. Wings yellowish gray, hyaline in places, darkened near the apex; stigma and costa yellow; cell M–3 closed and petiolate.

Female.—Length 6 to 7 mm. Very nearly as in the male. The shining black callosity above the antennae broader, above this a black velvet spot on each side near the eye (see fig. 16); upper frons yellowish gray pollinose, ocellar tubercle flat. Pleura and sides of mesonotum seem more densely covered with beautiful iridescent scales than in the male. General infuscation of wing as in the male; no distinct apical spot. The color of the abdomen evidently varies from reddish to almost black; pale sparse pile on the first three segments, black beyond; thick covering of scales at base of abdomen.

Type locality.—Holotype, male, and allotype, female, collected on the sand dunes near San Francisco, California, June 6, 1920 (F. R. Cole).

Type.—Cat. No. 25929, U.S.N.M.

Paratypes.—A single male paratype in the National Museum, collected in Ormsby County, Nevada, July 6 (C. F. Baker), was sent to Kröber by the National Museum and was returned labeled "n. gen. et sp., near *Ozodiceromyia*." Several paratypes are in the Cornell University collection, taken at Felton, California, May 25, 1908 (J. C. Bradley). Two paratypes in the Stanford University collection were collected at Palo Alto; other paratypes are in the California Academy of Sciences and in the writer's collection, taken in the type locality. Paratypes from the writer's collection were sent to the British Museum, Philadelphia Academy of Natural Sciences, Museum of Comparative Zoology, C. W. Johnson, and Prof. M. Bezzi.

On the date that the types were collected the writer went out to the sand dunes at the edge of Golden Gate Park, near San Francisco, in company with E. P. Van Duzee, and a good series of this remarkable little species was taken. They were running over small open spaces out in the dune vegetation and did not get out in the wind-swept open sand. None of the specimens were seen to fly more than a few inches and none were swept from vegetation. The males seemed to be more active than the females; when seen from above they blend with the dead brush and dune land over which they run and fly.

Genus FURCIFERA Kröber.

1911. *Furcifera* KRÖBER, Ann. Mus. Nat. Hung., vol. 9, p. 524.

The genus is near *Psilocephala*, judging from the description. The third antennal joint is longer than the first and second combined, the first about three times as long as the second; the style is on the underside of a strongly produced tip. The abdomen and legs are relatively long, the fore metatarsi thickened.

The only species known, *F. fascipennis* Kröber, is described from a female. The upper part of the frons is semishining black, the face

and lower frons silvery white, between the two colors a velvet black spot. The wings have a dark brown crossband.

Type localities.—Oaxaca, Mexico; Brazil.

Type.—In the Hofmuseum, Vienna.

EPOMYIA, new genus.

Nearly related to *Psilocephala* and *Furcifera*, four of the species having been taken from the former genus. No specimens of *Furcifera* were available for comparison, but from Kröber's description it is clear that the genus is close to *Epomyia;* both genera have enlarged metatarsi and a velvet black spot in the center of the frons and the antennae are evidently allied in structure. All of the known species of *Epomyia* have rather long, slender antennae, the third joint longer than the first and of a peculiar shape, the tip broad and hollowed out on the outside, the small style fitting in the excision. (See figs. 30, 31, 32, 36, and 37.) The bristles on the first and second joints are very short and hairlike. There is a more or less elongated velvet black spot on each shoulder inside the humeral callosity. The scutellar bristles are very short and in some species variable in number. The wings are banded and are proportionately small, especially in the females, which have rather long slender abdomens. The venation is like that of *Psilocephala,* cell M–3, however, being closed in all the species and petiolate like the cell first A (anal cell).

Genotype.—*Psilocephala pictipennis* Wiedemann.

TABLE OF MALES.

1. Scutellum orange red ..... scutellaris (Loew).
   Scutellum black ..... 2.
2. First antennal joint about as long as the third ..... sumichrasti (Bellardi).
   First antennal joint much shorter than the third ..... 3.
3. Margin of scutellum with short yellow pile; wings almost entirely whitish hyaline; abdomen often largely reddish ..... rufiventris (Loew).
   Margin of scutellum without yellow pile; abdomen black. pictipennis (Wiedemann).

TABLE OF FEMALES.

1. Abdomen largely red; two faint blackish bands on the wings. rufiventris (Loew).
   Abdomen black ..... 2.
2. Scutellum orange red ..... scutellaris (Loew).
   Scutellum black ..... 3.
3. First antennal joint much shorter than the third .... pictipennis (Wiedemann).
   First antennal joint about as long as the third ..... 4.
4. Antennal style subapical and not projecting beyond the end of the third joint; wings with two narrow hyaline crossbands; southern species. bella, new species.
   Antennal style projecting beyond the tip of the third joint; wings with a wide median hyaline crossband; tropical species ..... sumichrasti (Bellardi).

EPOMYIA RUFIVENTRIS (Loew.)

Plate 4, figs. 19, 25, and 37.

1869. *Psilocephala rufiventris* Loew, Berlin. Ent. Zeitschr., vol. 13, p. 12.

Male.—Length 5.5 mm. to 6.5 mm. Head black, face and most of the frons silvery white pollinose, the upper corner of frontal triangle velvety black. Pile of proboscis and palpi short, brownish. First two joints of antennae yellowish, with short black hairs, the third joint slightly longer than the first two combined and wider than either. Occiput thin silvery pollinose and white pilose; post-ocular bristles black.

Thorax black, largely blue-gray pollinose, a large velvet black spot over the humeri, reaching back to the suture; two silvery vittae inside the black spots; a few whitish hairs on the mesonotum. Scutellum velvet black, without pile, on disk its base narrowly grayish, the margin with about four short black bristles. Pleura black, blue gray pollinose with sparse white pile. Knobs of halteres large, blackish, the stem paler. Pteropleura shining black.

Abdomen black, first three segments silvery gray pollinose, the fourth to sixth segments shining black; a few black hairs on sixth segment, the rest of the abdominal pile white. Genitalia reddish yellow with reddish bristles and hairs. The second abdominal segment is as long as the fourth, fifth, and sixth combined. Femora black, tibiae black with brown tips; fore tarsi entirely blackish, dilated, with short black pile; hind tarsi yellow except the tips (in some specimens only the base yellowish); femora with reclinate silvery white pile. Wings whitish hyaline, with an apical gray spot on R–4 and a spot near the middle of the wing (remnant of a crossband found in the female); cell M–3 closed, the stigma brown. The markings on the wings of some males are almost obsolete.

Female.—Length 7 to 9 mm. Many characters like the male. Frons narrow, shining black above, the lower half and ocellar tubercle silvery gray pollinose; in the center of the frons a small transverse velvet black spot. (Fig. 25.) Antennae pale brown, first two joints more or less yellowish.

Thorax nearly as in the male, the pile very short, reclinate, and yellowish; bristles short; a few short erect hairs on margin of scutellum. Pleura blackish gray pollinose, the pteropleura bare and shining; very short pile on pleura and coxae. Knobs of halteres brown, the stems paler.

First abdominal segment blackish, gray pollinose and with very short yellowish pile; the rest of the abdomen usually bright reddish yellow, the incisures darker, the venter the same as the dorsum; pile of first three segments pale, beyond this short, black, erect. Short yellow pile on the genitalia and the circlet of bristles yellowish.

Legs as in the male. Wings whitish hyaline, with two dark-gray bands, one near the apex, the other near the middle of the wing (see fig. 19); cell M–3 closed and petiolate, the stigma brown.

Type locality.—Nebraska.

Type.—In the Museum of Comparative Zoology, Cambridge.

Specimens examined, 16 males, 24 females.

Distribution.—The distribution according to 16 males and 24 females is:

Canada: Ontario, June 6 [Canad. coll.]; Burlington, Ontario, June (H. C. Huckett), [Cornell].

Rhode Island: Buttonwoods, July 25 (C. W. Johnson).

Massachusetts: Woods Hole, July 23 (W. M. Wheeler); Horses Neck Beach, August 3 (Hough).

New Jersey: Clementon, May 30 [Univ. of Kans.]; Pleasantville (Phil. Laurent) [Harrisburg coll.], also Stone Harbor, July 5 (Daecke).

Virginia: Virginia Beach, August 11 (Knab), [U. S. Biol. Survey].

Maryland: Beltsville, May 25, June 14, July 1 (McAtee) and June 28 (Jackson), [U. S. Biol. Survey]; Camp Meade, June (R. C. Shannon), [Shannon].

Florida: Palatka, May 4 (Bradley), [Cornell].

District of Columbia: Washington (Banks), [Cole].

Ohio: Sandusky, June 8 (Hine), [Hine].

Indiana: Whiting, August 13 (W. M. Wheeler), [Amer. Mus.]; Plymouth, July 15, "predaceous on cutworms" (H. K. Laramore), [Cole].

Illinois: Lake Forest, June 11 [Cornell]; Chicago, May 28 (W. M. Wheeler), [Amer. Mus.].

Michigan: Agricultural College, June 9 to August 11 [Cornell].

Montana: "Montana" [Kans. Univ.].

Nebraska: "Fr. Mt.," July 9 to 21 [Amer. Mus.].

EPOMYIA SCUTELLARIS (Loew).

Plate 4, figs. 26, 29, 30, and 35.

1869. *Psilocephala scutellaris* Loew, Berlin. Ent. Zeitschr., vol. 13, p. 171.

Male.—Length 6.5 to 8 mm. Head black, face silvery white pollinose, the lower part of frontal triangle more gray, the upper part filled with a diamond-shaped velvet black spot. Antennae of medium length, with short hairs on the first two joints as in the other two species of the genus (see fig. 30), the first two joints reddish yellow, the third slightly longer than the first two together and brown in color. Pile of palpi short and black. Occiput gray pollinose and white pilose.

Thorax gray-black with two broad opaque black bands from humeri almost to base of wing. Pile short, yellowish, tomentumlike. Scutellum orange-red, the base narrowly blackish, a few short black

erect bristles near posterior margin and usually four short, erect black bristles. Pleura black, gray pollinose, thinly white pilose, the pteropleura largely shining. Knob of halteres brown, the stem yellowish.

Abdomen black, the dorsum mostly silvery pollinose with short white pile, longer at the sides of the first segment; second segment with a silky white posterior border; segments 1, 4, 5, and 6 more blue-gray pollinose; the last three segments very short, their combined length less than that of the second and about equal to that of the third; these segments shining blackish with yellowish pile. Genitalia reddish yellow with golden yellow pile, the upper forceps deeply excavated and projecting beyond the lower. There is black pile on segments 3 to 6 of the venter. Femora blackish brown; hind tibiae brown, the anterior ones yellowish brown; fore tarsi enlarged and blackish, the first joint of other tarsi and base of second yellowish, the rest brown. Wings hyaline, the apex pale grayish, much shorter than in the female; costal cell and veins at base of wing yellowish, the stigma pale brown; cell M–3 closed and petiolate.

Female.—Length 8 to 10 mm. Closely resembling the male in most characters. Almost bare of pile. Frons narrow, the upper half shining black, the lower gray-white pollinose; between the colors a diamond-shaped spot, velvet black in color, in some specimens rounded below and pointed above.

Tomentumlike pile of thorax shorter than in male. Mesonotum with two faint gray-blue vittae, on either side a more whitish stripe bodering the opaque black one over the humeri. The short bristles of the scutellum quite variable, two, three or four being present and these often differing in size. Halteres light yellowish brown, the tips of the knobs darker.

Abdomen black, semishining; pile on two basal segments whitish, beyond with usual short, black, erect pile on dorsum and venter. Genitalia reddish yellow with a yellowish circlet of bristles. Legs colored about as in the male; fore tarsi blackish with many short, black, bristlelike hairs, and enlarged as in the other sex. Wings with crossbands more definite than in the male (see fig. 29); cell M–3 closed and petiolate.

Type locality.—District of Columbia.

Type.—In the Museum of Comparative Zoology at Cambridge.

Distribution.—The following localities are given for two males and three females:

North Carolina: Black Mountains, June [Amer. Mus.].

New York: Van Cortland, June 22 and July 11 (J. L. Zabriskie), [Amer. Mus.]; Mosholu [Amer. Mus.].

Kröber gives New York and Brazil for the male and adds a record from Paraguay for the female.

EPOMYIA PICTIPENNIS (Wiedemann).

Plate 4, figs. 20, 22, 28, 34, and 36.

1821. *Thereva pictipennis* WIEDEMANN, Dipt. Exot., p. 113.
1869. *Psilocephala erythrura* LOEW, Berlin. Ent. Zeitschr., vol. 13, p. 172.

Male.—Length 6 to 7 mm. Frontal triangle and face silvery white, the upper corner of triangle velvet black. Antennae slender, cylindrical, the third joint slightly longer than the two first combined, with short hairlike bristles (see fig. 36); the first two joints yellowish, the third yellowish brown. Pile of head short, whitish; that on the palpi very sparse.

Thorax blue-gray pollinose; base of scutellum whitish, the rest velvet black; the usual black stripe inside of the humeri. Bristles of the scutellum short, erect, black. Halteres black, the stem paler. Pleura with scant white pile.

Abdomen silvery white tomentose above, the ground color black, thinly gray pollinose. Genitalia reddish yellow, with yellow pile above, some black below. Legs blackish brown, with white pile on the femora and coxae; four hind tibiae and the two basal joints of the hind tarsi yellowish. Wings hyaline (said to be pale yellowish in fresh specimens); stigma and veins brown; vestiges of two blackish bands, one near the tip of wing, the other near the middle; cell M–3 closed and long petiolate.

Female.—Length 7 to 9 mm. Resembling the male in most characters. Upper part of frons and the ocellar tubercle shining black, the lower part silvery white pollinose, a velvet black spot in the middle between the two colors (fig. 20). Face silvery white pollinose; frons and face bare of pile; top of occiput shining blackish, the rest whitish pollinose with very sparse, short white pile. Proboscis and palpi black, very short white pilose.

Thorax colored as in the male; blue-gray pollinose, the two black stripes very definite; in the center between these stripes a narrow dark-brown stripe; next to the broad black vittae and along the lateral margins of the thorax the pollen is silvery. The white base of the scutellum very marked, the rest of the surface black, as in the male. Pile of the thorax mostly black, very minute. Halteres as in the male.

Abdomen a peculiar slate black, the thin covering of gray pollen giving a blue tinge; pile very sparse, short whitish on the first three segments, denser, and short erect black on the remainder of the abdomen, including the genitalia; circlet of spines on the genitalia yellowish. Femora dark brown, pile very short, pale, the bristles small and black; fore tibiae and tarsi black, the fore metatarsi enlarged as in the other species of the genus, the other tibiae except the tips and the basal joints of the tarsi yellowish brown. Wings longer than in

the male, the bands much broader, in some specimens the whole wing more or less infuscated; venation as in the male (fig. 22).

Type locality.—Savannah, Georgia.

Type.—The type of *P. erythrura* Loew is in the Museum of Comparative Zoology, Cambridge. Wiedemann's type is presumably in the Westermann collection now in the Zoological Museum, Copenhagen.

Distribution.—Distribution according to 5 males and 27 females is:

Massachusetts: Groton, July 8 (C. W. Johnson), [Cole].

Connecticut: New Haven, June 9 (H. B. Kirk), [Harrisb. coll.].

New Jersey: Riverton, June 15 (Daecke), [Harrisb. coll.]; Riverton, July 7 and 11 (C. W. Johnson), [Cole].

New York: Sanford (M. C. Van Duzee); Orient, July 12 (Zabriskie), [both Amer. Mus.].

Maryland; Beltsville, June 15 (McAtee), [Biol. Survey]; Bladensburg, June 23 (R. C. Shannon), [Shannon].

North Carolina: Black Mountains [Amer. Mus.].

Georgia: Thomasville, July 22 [Amer. Mus.]; Tifton, September 3 [Kans. Univ.].

Florida: St. Augustine, March 15 (C. W. Johnson), [Cole]; Crescent City, April 20 (M. C. Van Duzee), [Amer. Mus.]; Palatka, May 4 (Bradley), and Fort Meyers, May 7 (Bradley), [both Cornell]; Enterprise, April 15; Key Largo, November 6; Gotha, March (W. M. Wheeler); Clearwater, April 1 to 30 (M. C. Van Duzee); St. Petersburg, April 28 (M. C. Van Duzee); Fort Meyers, March 31; Estero (M. C. Van Duzee), [all Amer. Mus.].

Illinois: Chicago, June 10 (M. W. Wheeler), [Amer. Mus.].

Texas: Galveston, June 5 (W. M. Wheeler), [Amer Mus.].

Kröber records the species from the type locality and from the following places: Tifton, Georgia; Atco and Westville, New York; Riverton, New Jersey; Toronto, Ontario, Canada.

EPOMYIA SUMICHRASTI (Bellardi).

Plate 4, figs. 23, 24, 32, and 33.

1862. *Psilocephala sumichrasti* BELLARDI, Saggio di Ditter. Messic., pt. 2, p. 91.

The original description makes the species recognizable. Bellardi described only the male.

Type locality.—Tuxpango near Orizaba, Mexico.

Type—In the collection of Bellardi, Turin, Italy.

The following notes are made from two specimens in the Stanford University collection, determined as *sumichrasti* by Coquillett, and seeming to fit the original description except in the relative length of the antennal joints. The specimens, a male and female, were collected at Granada, Nicaragua, by C. F. Baker.

Male.—Length 7.5 mm. Ocellar tubercle gray pollinose. Antennae brownish yellow, the first joint about as long as the third (see fig. 32), the style and bristles short. Lower part of the head with whitish pile. There are indications of a median colored crossband on the eye, probably quite apparent in life.

Pile of mesonotum short and yellowish. On each side, over the humeri, a velvety brown spot; mesonotum largely gray pollinose. Scutellum velvety black, with three or four short black marginal bristles, a few black pile on the margin (the rest may be rubbed off). Halteres yellowish brown.

Abdomen not flattened at the tip; some black pile below on the fourth segment, all the pile of the fifth and sixth black and rather dense; pile on the basal segments whitish. Genitalia reddish yellow, with reddish yellow pile, the lower claspers slightly longer than the upper (see fig. 33). In the specimen examined the anterior legs are entirely yellowish brown.

Female.—Length 9 mm. Closely resembles the male. Frons narrow, with the usual markings of the genus. (Fig. 24.) Some blackish pile on the oral margin below and on the proboscis. Mesonotum with two narrow shining black vittae, just inside the humeral brown spots. Scutellum as in the male, with four marginal bristles. Genital segment reddish yellow, the rest of the abdomen black; second segment with a white posterior border; first segment gray pollinose, as are sides and posterior margin of second and most of third and fourth, the rest shining blackish brown, with short erect black pile. Wings largely infuscated. (Fig. 23.)

EPOMYIA BELLA, new species.

Plate 4, figs. 21, 27, and 31.

Female.—Length 9.5 mm. Head black, with more or less whitish pollen which extends across the frons above the antennae (fig. 21); upper part of frons and ocellar tubercle shining and bare. Face and occiput whitish pollinose, the bristles of the occiput short and black; proboscis and palpi brown, short black pilose. The antennae about as long as the head, yellowish, the third joint about as long as the first, ending bluntly, and brownish yellow in color; short black hairs on first two antennal joints and base of third. (Fig. 31.)

Thorax black, gray pollinose (markings in the type obscured by grease, if present), with sparse yellowish, tomentumlike pile. Scutellum velvety blackish brown and bearing two short marginal bristles, the base narrowly gray pollinose. Pteropleura partly reddish in ground color, the remainder of pleura black, gray pollinose. Halteres yellowish.

Abdomen yellowish red, darker toward the tip; venter the same color; posterior margins of third, fourth, fifth, and sixth segment of dorsum blackish; circlet of spines on the genitalia and most of the short pile yellowish; the short erect pile of segments four to seven black, some black pile at base of eighth. Coxae and femora yellowish, the hind coxae with short apical spines; tibiae brownish yellow, the front pair darker apically; front tarsi blackish, the others paler. Wings with much the same venation and marking as in *E. scutellaris* Loew (fig. 27); the costal cell and stigma yellowish; a large part of the wing infuscated, the extreme apex, a subapical, and a median band whitish hyaline.

Type locality.—Macdona, Texas, July 29, 1911 (H. A. Wenzel).

Type.—A female. In the Philadelphia Academy of Natural Sciences.

Only the unique type is known. It is closely related to the other species of the genus and very probably has its center of distribution in Mexico or Central America.

Genus PSILOCEPHALA Zetterstedt.

1838. *Psilocephala* ZETTERSTEDT, Ins. Lappon. Dipt., p. 525.

Usually small or medium sized species. Head nearly semicircular, the frons more vertical than horizontal, thus differing from *Nebritus* and *Metaphragma;* occiput well developed, but the cheeks rather narrow. Antennae porrect and set on more or less of a protuberance, varying greatly in shape and size in different species, but never longer than the head; the first joint often quite large, the second always short, the third usually longer than the first and with a more or less apparent apical style; the first two joints with bristles and hairs. The males are holoptic, the eyes of the female widely separated. The frons of the female may be entirely pollinose, may possess two black spots or be largely shining black, the markings being of specific value. Kröber includes a few species in the genus in which the eyes of the male are narrowly or even widely separated, and there is one North American species, *P. latifrons*, placed provisionally in this group. The face is bare and usually silvery pollinose; palpi club-shaped and long pilose; the mouth parts are rather large.

The thorax is oval, seldom very convex, often quite thickly erect pilose in the male, as a rule sparsely reclinate pilose in the female. There is a remarkable uniformity in the chaetotaxy of *Psilocephala* and *Thereva*, the specific variation being little, if any, and yet there is a great deal of individual variation. The praesuturals and supra-alars are present, one postalar and one or two pairs of praescutellar bristles. The scutellum is of medium size, semicircular, and with one or two pairs of marginal bristles. The metanotum is small, bare, and almost concealed by the scutellum.

The abdomen is more or less conical and is usually much shorter in the male than in the female, although longer than the thorax in all the species. Male abdomen with seven obvious segments, the last two very small; dorsum of the first six in some species densely silvery pollinose and flattened. Male genitalia often quite large, the structure easily made out, and of specific importance, offering more definite specific differences than in *Thereva* and quite variable in general shape; the epiproct and hypandrium are usually shining, never thickly pollinose. The eighth segment of the female forms the base of the ovipositor and there is a terminal circlet of spines. In the female the abdomen is often apparently bare of pile at low magnifications, the pile on the fifth to eighth segments very short and erect. Legs slender and usually red or yellow and black; sparse pile on the coxae in addition to the bristles; pile on the femora mostly short and reclinate and short on the hind femora. There are about two coxal bristles in front, four on the middle and hind pair; usually two bristles below near middle of anterior femora; an irregular anteroventral row of six or seven on the hind femora; tibiae with rows of small bristles and several apical larger ones, the bristles of the anterior pair not extending to the base. Wing venation typical of the family, cell M–3 more often closed than open, in some species petiolate; the wings in a few species spotted, never banded as in the related genus *Epomyia*, usually hyaline or with a mark on the outer side of cell first M–2 (discal cell); in some species there is a sharp curve in the upper fork of the radial vein.

SYNOPSIS OF MALES.[8]

1. First antennal joint unusually thick; pile of the mesonotum tomentumlike; hypopygium large ..... 2.
   First antennal joint usually rather slender; more or less erect pile on the mesonotum ..... 4.
2. Pile of the genitalia and mesonotum yellowish; bristles of the occiput yellow. **variegata** Loew.
   Pile of genitalia largely black; orbital bristles black ..... 3.
3. Pile of mesonotum golden yellow; two scutellar bristles. **variegata flavipilosa**, new subspecies.
   Pile of mesonotum silvery white; four scutellar bristles. **variegata occidentalis**, new subspecies.
4. Wings broad and densely spotted with brown; R–4 acutely bent near tip .. 5.
   Wings usually hyaline, never spotted; R–4 not sharply bent down before the tip ..... 6.
5. Apex of frontal triangle with a black spot ..... **acuta** Adams.
   Apex of frontal triangle golden brown ..... **tergissa** (Say).
6. Abdomen rather flattened above, shining black on the sides, silvery on the dorsum (*haemorrhoidalis* group) ..... 7.
   Abdomen more or less rounded, usually pollinose on the sides ..... 15.

[8] The eight new species in Kröber's 1914 paper are not included in the synopses of species. Walker's species are omitted, being unrecognizable from the descriptions, also *occipitalis* Adams, not seen by the writer. The female of *festina* Coquillett runs to couplet 28; the frons is entirely gray.

7. Halteres black ..... 8.
Halteres yellow ..... 13.
8. Genitalia with two clumps of black bristles on the hypandrium, the rest of the pile of the genitalia pale; frons with a wide median shining black patch. **frontalis**, new species.
Pile of genitalia mostly black; no conspicuous bristles on the tips of the plates of the hypandrium; frons with a narrow wedge of shining black. **haemorrhoidalis** (Macquart).
Genitalia and frons not as described ..... 9.
9. First two antennal joints yellowish ..... **arizonensis**, new species.
First two antennal joints black ..... 10.
10. Costal cell blackish brown, the rest of the wing hyaline ..... **costalis** Loew.
Costal cell hyaline or slightly infuscated ..... 11.
11. Mesonotum vittate; femora yellowish brown ..... **notata** (Wiedemann).
Mesonotum dull-gray pollinose except on the margins; legs almost wholly black ..... 12.
12. Legs usually entirely black, as are the halteres; wings with a dark discal spot. **signatipennis**, new species.
Bases of tibiae reddish; no definite discal spot ..... **platancala** Loew.
13. Halteres brownish yellow; mesonotum and scutellum with golden tomentumlike pile ..... **flavipennis**, new species.
Halteres bright yellow ..... 14.
14. Mesonotum somewhat shining, faintly whitish vittate; stigma and wing veins very pale yellow ..... **laerigata** Loew; **aldrichi** Coquillett.
Mesonotum and scutellum gray-brown pollinose except sides, which are shining ..... **lateralis** Adams.
15. Hypopygium large, shining black; cell M–3 closed; frons bare and silvery pollinose ..... **munda** Loew.
Hypopygium not large and shining black ..... 16.
16. Eyes separated by the width of the ocellar tubercle; cell M–3 wide open. **latifrons**, new species.
Eyes holoptic, or nearly so ..... 17.
17. Knob of the halteres yellow or whitish ..... 18.
Knob of the halteres blackish ..... 25.
18. Femora yellowish ..... 19.
Femora black ..... 20.
19. Thorax and abdomen yellow ..... **occipitalis** Adams.
Thorax and abdomen black, abdomen silvery white pollinose. **montivaga** Coquillett.
20. Second, third, and fourth abdominal segments shining reddish. **aurantiaca** Coquillett.
Abdomen not colored thus, usually black and pollinose ..... 21.
21. Large western species; gray pollinose; genitalia large; apex of knob of halteres whitish ..... **limata** Coquillett.
Smaller and usually more slender species ..... 22.
22. Abdomen largely yellow in ground color; third antennal joint and its style very slender ..... **festina** Coquillett.
Abdomen black in ground color ..... 23.
23. Heavy bodied species, about 9 mm. in length; genitalia black in ground color; thorax not vittate ..... **pollinosa**, new species.
Much smaller species; genitalia yellowish ..... 24.
24. Erect pile on mesonotum rather long; upper corner of frontal triangle blackish. **cinerea**, new species.
Pile of mesonotum short; upper corner of frontal triangle brown pollinose. **morata** Coquillett.

25. Pile of body largely black; first antennal joint rather thick.... **pavida** Coquillett.
Pile of body largely white; first antennal joint rather slender ..... 26.
26. Upper fork of Rs strongly bent; tropical species..... **senilis** (Fabricius).
Upper fork of Rs not strongly bent; species of more northern distribution.. 27.
27. Third antennal joint very short; pile of the genitalia whitish.. **baccata** Coquillett.
Third antennal joint about as long as the first and second combined.
argentifrons, new species.

TABLE OF FEMALES.

1. Only lower corners of frons silvery pollinose, the rest shining black and more or less convex; cell M–3 closed and petiolate (*haemorrhoidalis* group)..... 2.
Frons largely covered with pollen, usually entirely so..... 12.
2. Femora yellowish brown..... **johnsoni** Coquillett; **notata** (Wiedemann).
Femora black..... 3.
3. Halteres yellow..... 4.
Halteres black, at least the knob black..... 7.
4. Halteres brownish yellow, not bright yellow; tomentumlike pile of mesonotum and scutellum golden; eastern species..... **flavipennis**, new species.
Halteres bright yellow..... 5.
5. Mesonotum dense gray pollinose in the central part, the margins shining black; front tibiae entirely black; wings yellowish and pale brownish.
lateralis Adams.
Mesonotum not marked thus, with whitish vittae; base of tibiae reddish.... 6.
6. Upper half of frons gray pollinose..... **laevigata** Loew.
Frons almost entirely shining black; thoracic vittae very distinct; wing veins very pale yellow..... **aldrichi** Coquillett.
7. First two joints of antennae yellowish red; western species.
arizonensis, new species.
First two joints of antennae black..... 8.
8. Wings with a distinct blackish discal spot; legs entirely black in typical specimens; halteres wholly black..... **signatipennis**, new species.
Wings with an inconspicuous discal spot or generally infuscated; all tibiae usually reddish at base..... 9.
9. Front tibiae black, base of hind tibiae reddish; costal cell blackish brown.
costalis Loew.
All the tibiae reddish at the base..... 10.
10. Lower corners of frons with a triangle of silvery pollen reaching up from the face; mesonotum with a blackish median vitta; species found east of the Rocky Mountains..... **haemorrhoidalis** (Macquart).
Lower corner of frons not with a silvery triangle, a narrow strip reaching from the face a short distance up along the eye margin..... 11.
11. Wings largely infuscated; mesonotum with a faint median vitta; western species.
platancala Loew.
Wings hyaline except for a small discal spot; mesonotum with a distinct dark median vitta; eastern species..... **frontalis**, new species.
12. Upper two-thirds of frons shining black, the lower third silvery pollinose; antennae rather short..... 13.
Frons entirely pollinose, sometimes with darker markings..... 14.
13. Upper part of frons flattened, rough, the lower part bare of pile; base of tibiae reddish..... **munda** Loew.
Upper part of frons convex, with a median impressed line, the lower portion with a few short black pile; legs black..... **melampodia** Loew.
14. Frons with velvet black spots..... 15.
Frons without black spots..... 22.

15. First three abdominal segments largely shining red; frons very narrow and with two small black spots ..... 16.
Abdomen not colored thus and densely pollinose ..... 17.
16. Bristles of the body and the thoracic calli black ..... aurantiaca Coquillett.
Bristles of body and thoracic calli yellowish ..... subrufa, new species.
17. Lower angle of eye acute; wings largely dark gray, spotted white; frontal black spots small; western species ..... acuta Adams.
Lower angle of eye acute; cross veins clouded and a few other spots on the veins; frontal spots large; the upper part of frons darker than lower; eastern species. tergissa (Say).
Lower angle of eye not acute; R–4 not so deeply bent near tip as in *tergissa* and *acuta;* species with a narrower frons ..... 18.
18. Frons with a median black triangle in addition to the spot on each side next the eyes; third antennal joint about as wide as the first, and longer. montivaga Coquillett.
Frons with only two velvet black spots. ..... 19.
19. First antennal joint distinctly wider than the third and about as long, with long black bristles; pile largely black. ..... pavida Coquillett.
First antennal joint more slender than the third ..... 20.
20. Femora yellow; abdomen largely yellow ..... slossoni Coquillett.
Femora black; abdomen black in ground color ..... 21.
21. Knob of halteres and hypopygium black. cinerea, new species, baccata Coquillett.
Knob of halteres and hypopygium yellow ..... morata Coquillett.
22. Frons with two diverging lines of black from the base of the antennae; large boreal species, about 16 mm. in length; femora and tibiae black. grandis Johnson.
Frons without any markings of this kind; smaller species ..... 23.
23. Femora yellow; abdomen largely yellow. ..... placida Coquillett.
Femora blackish brown or black ..... 24.
24. Abdomen with reddish brown side spots and reddish apex; hind femora deeply furrowed; tropical species ..... senilis (Fabricius).
Abdomen black in ground color ..... 25.
25. First antennal joint greatly swollen and strongly bristled, longer than the third joint; a dark mark from the base of the antennae to the eye margin ..... 26.
First antennal joint smaller than the third ..... 28.
26. Pile of mesonotum short and black; wings largely clouded; western species. fuscipennis, new species.
Pile of mesonotum yellow or golden ..... 27.
27. Scutellum with four bristles; pile of frons and mesonotum pale yellowish; occipital bristles yellow ..... variegata Loew.
Scutellum with two bristles; post-ocular bristles black; pile of thorax and frons largely golden yellow ..... variegata flavipilosa, new subspecies.
28. Broad posterior margin of second, third, and fourth abdominal segments gray pollinose, fifth except narrow base and all of sixth; upper frons gray brown pollinose; western species ..... limata Coquillett.
Posterior angles of second, third, fourth, and sixth abdominal segments gray pollinose, fifth almost wholly so; upper frons thinly blackish brown pollinose; boreal species ..... canadensis, new species.

The HAEMORRHOIDALIS group.

There is a definite group in the genus *Psilocephala* which might be called the *haemorrhoidalis* group; it has several widespread species

which closely resemble one another, the females of some being separated by minute differences. The male abdomen is short, flattened above, and densely silvery pollinose; the male genitalia are of the same general type. The antennae are of the same structure and general shape. The frons of the female has a large shining black callosity which fills nearly the whole space between the eyes.

PSILOCEPHALA HAEMORRHOIDALIS (Macquart).

Plate 6, figs 47 and 48; plate 13, figs. 171 and 172.

1840. *Thereva haemorrhoidalis* MACQUART, Dipt. Exot., vol. 2, p. 26.

There has been some discussion as to what species Macquart was describing, as there are several species which might answer the description. The writer has designated the form most common in the type locality, a species having a wide distribution over the Eastern States. Kröber had no clear idea of the species, as he placed several forms under that name in the United States National Museum material; he intimates that *P. haemorrhoidalis* may turn out to be a synonym of *Thereva nigra* Say, and in his paper on the North American Therevidae writes the following:

> In the Wiener collection there are before me specimens (females) of *Thereva nigra* Say (which belonged to the Wiedemann collection and also bear his determination), which seem to belong to the above species (*P. haemorrhoidalis*). They are true *Psilocephalae*, with bare face but thickly pilose palpi. If it is determined that *Thereva nigra* Say is a *Psilocephala* species, then must *P. haemorrhoidalis* be made a synonym of it. Coquillett wrote that *Thereva nigra* was a true *Thereva*.

Larva.—Malloch gives a description of the larva[9] and figures both larva and pupa in the same publication. The larva is probably not distinguishable from the larva of *P. frontalis* new species.

Pupa.—The rows of spines and thorns on the abdominal segments are arranged in a characteristic fashion, the other structures being about the same as in *P. frontalis*. The first abdominal segment has six evenly spaced slender spines across the middle of the dorsum; segments two to six have two short yellow spines on each side of the median line and on each side of this short and long spines (see figs. 171 and 172); on the seventh segment the spines are long and curved. Along the sides of the abdomen there are raised tubercles above the spiracles and below these a group of four slender spines.

Type locality.—"Carolina."

Type.—Presumably in the Museum of Lille, France.

Below is given a description of what is considered to be this species:

Male.—Length 6 to 7 mm. Black, almost entirely white pilose; frontal triangle silvery on the sides, with a narrow central wedge of shining black (fig. 48); the ocellar tubercle gray pollinose. Face sil-

[9] Bull. Ill. State Lab. of Nat. Hist., vol. 11, art. 4, p. 334.

very white pollinose, a few short black hairs on each side of the median black frontal stripe. Antennae black, rather slender, the third joint a little longer than first and slightly wider in the middle; first and second joint and base of third with black bristles. Palpi brown with long white pile; post-ocular bristles black; cheeks with a black spot below the eye on which there is short black pile; cheeks and occiput white pilose; occiput gray pollinose above and white below.

Thorax black, more or less shining on sides of mesonotum, the dorsum bluish gray pollinose; a median black stripe, narrowed at the anterior and posterior ends; on each side of the median stripe a narrow, faint whitish stripe. Pile on the margins of the mesonotum white, brownish black on the central part of the dorsum. Scutellum gray pollinose, white on the posterior margin, with four black bristles and short white pile. Pleura except a large part of pteropleura dense silvery white pollinose, the pile white; very long pile before the halteres. Knob of the halteres blackish, the stem yellowish.

Abdomen black, largely gray or silvery gray pollinose, most of the dorsum bare of pile; the second to sixth segments silvery tomentose, bright in certain lights; a shining black spot on the sides of the second, third, and fourth segments near the base. Pile of the abdomen white, longer at the base, reclinate on the dorsum. The seventh segment scarcely visible in most specimens; genitalia reddish and yellow, with a few short yellow hairs, but mostly scattered long black pile. Femora black, appressed silvery white pilose, with some longer erect white pile below and behind on the two front pair; base of front tibiae and first tarsal joint yellowish, the rest black; on two hind pair of legs the tibiae and first two tarsal joints yellow except the blackish tips the other tarsal joints black; bristles of legs black. Wings hyaline, the stigma brown, the veins yellow at the base and in the costal region, otherwise brown; a pale brown spot at the outer side of the cell first M–2; cell M–3 closed and short petiolate.

Female.—Length about 7 mm. Closely resembling the male; bristles of first antennal joint shorter; frons shining black, slightly convex, smooth, the lower corners silvery pollinose (fig. 47), the vertex and ocellar tubercle gray pollinose.

Pile of mesonotum very short, black along the median line, on each side appressed yellowish; the lateral margins of the mesonotum short white pilose. Center of scutellum and the base black, the margin whitish pollinose; four black marginal bristles as in the male. Pile of pleura and coxae much shorter than in the male.

First segment of abdomen gray pollinose and white pilose, the rest of the abdomen shining black except the narrow posterior silvery margins of the second and third segments, the dorsum and sides of the fifth, and a silvery spot on the sides of the sixth. The pile of the first three segments short, reclinate, and white, on the other segments

short, erect black. Wings as in the male; often with a faint clouding of brown or gray in the tip of the wing.

Distribution.—The distribution according to 35 males and 55 females examined is:

New Jersey: Westville, August 14 [U.S.N.M.]; Anglesea, May 28 (Daecke); Lucaston, September 3 (Daecke); Riverton, June 15 to August 9 (Daecke and Johnson), [all C. W. Johnson].

New York: Rochester, June 24 to July 24 (M. D. Leonard); Honeoye Falls, June 16 (M. D. Leonard), [all Cornell]; Sea Cliff, Long Island (Banks), [Cole]; Bergen Island, July 20 (Zabriskie), and Flatbush, September 16 (Zabriskie), [both Amer. Mus.]; Batavia, July 20 [Minn.].

Maryland: Hancock, May 29 (Cole), [Cole]; Plummer Island, July 31 (R. C. Shannon) and July 9, "at light" (H. S. Barber), [both U.S.N.M.].

Pennsylvania: Alleghany County [Carnegie Mus.]; Lehigh Gap, July 11 [Cole]; "Penn." [U.S.N.M.]; Pittsburgh, July 23 (H. Kahl); Heckton Mills, June 15 (W. R. Walton); Castle Rock, Delaware County, June 17 (Daecke); Harrisburg, May 30 to August 16; Brandtville, July 14 (H. B. Kirk), [all Harrisb. coll.].

District of Columbia: No other data (Loew), [M. C. Z.].

North Carolina: "N. C." [U.S.N.M.]; Southern Pines, September 16 (A. H. Manee), [J. S. Hine]; Black Mountains, June [Amer. Mus.].

Alabama: Pickett Springs, Montgomery County, August 5 [Amer. Mus.].

Louisiana: Opelousas, May [Cole].

Ohio: Sandusky, Cedar Point, May 30 to July 14 (Hine); Columbus, 1896 (Hine); Hinckley, Medina County, August 17 (Hine); Lakeside, Ottawa County, August 2 (Hine), [all J. S. Hine].

Illinois: Chicago (W. M. Wheeler), [Amer. Mus.].

Michigan: Agricultural College, July 25 and August 10 [Cornell]; one specimen with no data, determined by Osten Sacken [M. C. Z.].

Kansas: Clay County (Hine), [J. S. Hine]; Johnson, Chautauqua, Linn, Montgomery, Cowley, and Sedgwick Counties (all R. H. Beamer), [all Kans. U.].

Missouri: Two miles west St. Louis, June 4 (W. V. Warner), [U.S.N.M.].

Texas: Waco (Belfrage), the specimen figured in Howard's Insect Book [U.S.N.M.]; no other data, September (Loew), [M. C. Z.]; College Station, June 4 (H. J. Reinhard), [Cole].

PSILOCEPHALA FRONTALIS, new species.

Plate 6, fig. 43; plate 13, figs. 168, 169, and 170.

This species has been placed with *haemorrhoidalis* in many collections and is very nearly like that species. There is no constant difference in size.

The male is distinguished from *haemorrhoidalis* by having more of the frontal triangle shining black, the black running to the base of the antennae. On the male genitalia there are two clumps of short black spines at the tip of the hypandrium, one on each plate (fig. 2); the rest of the pile is pale yellowish or whitish and not largely black as in *haemorrhoidalis;* thus the two tufts of black bristles are very noticeable. As far as can be made out at present, the female is to be distinguished only by the difference in the extent of the silvery pollen on the frons, there being no silvery triangles on the lower corners of the frons, which in *haemorrhoidalis* reach up beyond the base of the antennae (fig. 43). These differences are slight but constant and do not break down in any of the series examined. The two species overlap in their distribution over the Eastern States, but *frontalis* spreads much farther north and west. All of the Canadian specimens examined belong to this species and not to the true *haemorrhoidalis.*

Larva.—About 25 mm. in length and very slender, not more than 1.25 mm. wide at the thickest portion. White; the head small and dark brown. On the specimen there are no visible hairs on the head, but these have probably been rubbed off, as there are small marks resembling scars, situated much as in *P. haemorrhoidalis*, and the stigmatical spot is the same as in that species. The spiracles show plainly on the sides of nine of the abdominal segments, the last segment ending in two small styliform bodies as usual. On most of the abdominal segments there are peculiar markings caused by curved rows of small round indentations, which are branched in a more or less characteristic manner. (Fig. 169.)

Pupa.—The pupa is much like those of other known species of *Psilocephala* and *Thereva.* The arrangement of spines and tubercles does not seem to vary a great deal in the species examined. The general color is yellowish. Length about 9 mm. The two thorns on the head are quite long and sharply curved. (Fig. 170.)

Type locality.—Holotype, male, and allotype, female, collected at Rochester, New York, July 4 and 24, 1914 (M. D. Leonard).

Types.—In the Cornell University collection.

Paratypes.—Male and female, No. 25930, U.S.N.M.

Distribution.—Distribution according to 48 male and 72 female paratypes:

Canada: Maniwak, Quebec, July 12; Montreal, August 11 (Beaulieu); Ottawa, Ontario, July 20 to August 14 (Beaulieu); Belleville, Ontario; Ottawa, Ontario, July 16 (A. Gibson); Ottawa, Ontario, June 26; Ottawa, Ontario, July 3 and August 7 (W. Metcalfe), [all Canad. coll.]; Jordan, Ontario, July 10 and 20 (H. Curran), [Cole]; Toronto, Ontario, July 18 (C. W. Johnson), [Cole]; Ontario, July 21 (Evans), at light [Canad. coll.]; Burlington, Ontario, June (H. C. Huckett), [Cornell].

Maine: Kennebunkport, July (G. H. Clapp), [U.S.N.M.].

Connecticut: New Haven, June 30 (H. B. Kirk), [Harrisb. coll.]; "Conn." (Williston), [Kansas U.]; East River, July 11 (C. R. Ely), bred from borings in rotton apple wood [U.S.N.M.].

Massachusetts: "Mass." [Kans. U.]; Tyngsboro (F. Blanchard), [M. C. Z.]; Boston, July (C. W. Johnson), [Cole]; Woods Hole, August 25 (W. M. Wheeler), [Amer. Mus.]; Springfield (G. Dimmock), [U.S.N.M.]; Melrose Highlands, June 22 (D. H. Clemons); Tyngsboro (Riley); Nantucket Island, August 27 (Riley), [all U.S.N.M.]; Auburndale, August 13 [B. S. N. H.]; Marthas Vineyard, July 17 [B. S. N. H.]

Vermont: Rutland, August 8 [B. S. N. H.].

New Jersey: Jamesburg, July 4 [C. W. Johnson]; Newark, June 16 [C. W. Johnson]; Jamesburg [Amer. Mus.].

New York: Fishers Island, August 19 (Zabriskie), [Amer. Mus.]; Rochester, July 11 to 15 (M. D. Leonard), [Cornell]; Oswego, July 17 [C. W. Johnson].

Pennsylvania: "Pa." [Kans. U.]; Jeanette; Pittsburgh; Westmoreland County, July; Dauphin, July 14 [all Harrisb. coll.].

Indiana: Whiting, July 13 (W. M. Wheeler), [Amer. Mus.]; Wolf Lake, July 14 (W. M. Wheeler), [Amer. Mus.].

Ohio: No other data (Leow), [M. C. Z.].

Illinois: "Illinois" (H. Edwards); Chicago, June 16 to July 20 (W. M. Wheeler), [Amer. Mus.].

Michigan: Agricultural College, July 3 to 25 [Cornell]; Whitmore Lake, July 3 (E. G. Anderson), and Ann Arbor, July 25 (E. G. Anderson), [R. C. Shannon].

Wisconsin: Polk County (Baker), [Stanford]; Milwaukee, June 26 (W. M. Wheeler); Rochester, July 25 (W. M. Wheeler), [Amer. Mus.].

Minnesota: Olmsted County, June 24 and July 27 (C. N. Ainslee); Pipestone County, July 1; Big Stone County, July 25; Chicago County, July 16; Washington County, July 21; St. Anthony Park, June 29 [all Minn.].

Nebraska: "Neb." (Loew), [M. C. Z.]; Lincoln, July 21 to August 2 (C. C. Bradbury), [Cornell]; Lincoln, July (Riley), [U.S.N.M.].

South Dakota: Pierre [Stanford].

Wyoming: "Wyo." [U.S.N.M.].

Kansas: Onaga, July 27 (Hine); Clay County (Hine), [Hine]; Onaga (Crevecour), [U.S.N.M.]; Chautauqua County (Beamer); Gove County, June (Bailey), [Kans. U.].

Louisiana: New Orleans (Shufeldt), [U.S.N.M.].

PSILOCEPHALA FLAVIPENNIS, new species.

Plate 6, fig. 41; plate 7, fig. 69; and plate 8, fig. 107.

Male.—In general appearance much like *haemorrhoidalis* and in some respects like *aldrichi*, with which species it has been confounded.

Frons shining black, silvery pollinose on the lower corners. Antennae black, the third joint slightly longer and wider than the first.

The dorsum of the thorax lacks the distinct, dark, median thoracic stripe; pile of the dorsum reclinate and golden, very dense on the scutellum and the space in front of it. Pleura as in *haemorrhoidalis* and related species. Stem of halteres and base of knob brown, the rest of the knob yellowish brown (not bright yellow as in *aldrichi* or blackish as in *haemorrhoidalis*). Genitalia reddish, most all of the pile black (fig. 107 for structure). Wings yellowish hyaline, the veins yellowish brown; apex of the wing gray, the stigma yellow; cell M–3 closed. Legs as in *haemorrhoidalis*.

Female.—Distinguished from the female of *haemorrhoidalis* by the more apparent, short, tomentumlike golden pile on the thorax and scutellum, also by the pale-brown knobs of the halteres and the paler wing veins. The wings are darker than in the male, in some specimens with pale-brown infuscated areas; stigma yellowish. The frons is almost identical with *haemorrhoidalis* (fig. 17*c*), but the vertex and ocellar tubercle are shining instead of thinly gray pollinose.

Type locality.—Cupids Bower Island, Maryland, July 8 and 4, 1915 (R. C. Shannon).

Type.—Male, Cat. No. 25931, U.S.N.M.

Paratypes.—These consist of 11 males and 19 females, as follows:

Massachusetts: Woods Hole, July 18 (W. M. Wheeler), [Amer. Mus.]; Horseneck Beach, July 30 [B. S. N. H.].

Rhode Island: Buttonwoods, July 21 [B. S. N. H.].

New Jersey: Weymouth, August 16 (Daecke); Newbold, July 21 (Daecke); Stone Harbor, August 3 (Daecke); Lacy, July 22 (Daecke); Malaga, July 27 (Daecke), [all Harrisb. coll.]; Lakehurst, July 4 (C. E. Olsen); Clementon, August 8; Anglesea, September 1; Jamesburg, July 31 (C. W. Johnson), cotype of *P. aldrichi* Coquillett, Riverton, August 1 to 28 (C. W. Johnson), [all C. W. Johnson].

New York: "New York" [M. C. Z.].

Pennsylvania: Rockville, July 23 (Daecke), [Harrisb. coll.]; Natrona, July 30, and Philadelphia, July 22 [C. W. Johnson].

Virginia: Falls Church, July 17 and 25 (N. Banks), [Cole]; Falls Church, July 13 (Knab), [Biol. Surv.].

Maryland: Plummer Island, at light, August 3 (R. C. Shannon), [Cole]; Cupids Bower Island, July 8 (R. C. Shannon), [U. S. N. M.]; Plummer Island, July 14 to August 3 (R. C. Shannon), [Shannon].

PSILOCEPHALA NOTATA (Wiedemann).

Plate 7, fig. 75; and plate 8, fig. 85.

1821. *Thereva notata* WIEDEMANN, Dipt. Exot., p. 114.

This species is in the *haemorrhoidalis* group. The writer agrees with Mr. C. W. Johnson in his determination of this species, the

Florida specimens sent by him for examination answering the description very well.

Type locality.—Savannah, Georgia.

Type.—Presumably in the Westermann collection in the Zoological Museum, Copenhagen.

Male.—Length 7 mm. General body color black. The frontal triangle black in the center, silvery on the sides, flat and with a few short, black hairs. Face silvery pollinose; a black spot on the cheeks below the eye, clothed with short black pile; palpi brown, with white pile. Occiput gray pollinose above, silvery white below, with white pile; post-ocular bristles black. Antennae black, rather short and thick (fig. 85); first joint with black bristles; third joint about as long as the first and second and wider in the middle, the arista as long as the second joint.

Thorax black, shining on the sides, the mesonotum gray pollinose, with a faint indication of two white vittae and a darker central stripe. Dorsum with short tomentumlike golden yellow pile in the central part and erect black hairs, the margins with white pile. Scutellum black, gray pollinose and white pilose, with four black bristles on the margin. Pleura silvery gray pollinose and white pilose. Knob of the halteres blackish, the stem brown.

Abdomen black, largely silvery and gray pollinose and white pilose; sides of segments two, three, and four with a large shining black spot at base, the fifth segment with a smaller spot; the fifth, sixth, and seventh segments together about equal to the third. Dorsum of abdomen in certain lights intensely silvery. Genitalia reddish and black with mixed black and white hairs, the structure much the same as in *haemorrhoidalis*. Legs brownish yellow, darker at the ends of tarsi; silvery white reclinate pile on the femora, in addition to the erect white pile on the two front pair. Wings gray hyaline with a yellowish tinge; veins brown and yellow, the stigma pale brown, and a trace of a brown spot at the outer end of cell first M–2; cell M–3 closed and petiolate. (Fig. 75.)

Female.—Very nearly like the male, with the usual differences in this group. Frons and vertex, including the ocellar tubercle, shining black; the lower corners of frons silvery pollinose as in *haemorrhoidalis*. Bristles and hairs of antennae short and black.

Pile of the thorax much shorter than in the male, reclinate golden yellow and short erect black; a faint darker median stripe and an indication of two white vittae as in the male. Scutellum short reclinate golden yellow pilose.

Abdomen largely shining black; first segment faintly gray pollinose, with short erect white pile; second and third segments with distinct white posterior margins, bordered narrowly above by silvery gray pollen on which the pile is short, white, and reclinate; the rest of the

abdominal pile, above and below, short and black, erect beyond the third segment; silvery pollen on the sides and posterior margins of fifth and sixth segments. Legs and wings as in the male.

Distribution.—The four males and one female examined were from the following localities in Florida: Daytona, April 8 (C. W. Johnson); St. Augustine, March 13 (C. W. Johnson); Ormond (Mrs. A. T. Slosson), [all Cole]; Atlantic Beach, the pair described above (Mrs. Slosson), [U.S.N.M.].

Kröber gave Pennsylvania as an additional record in his paper on the North American Therevidae, but this record is doubtful.

PSILOCEPHALA ARIZONENSIS, new species.

Plate 6, fig. 58.

This species is in the *haemorrhoidalis* group and near *notata* Wiedemann, but has yellow antennae and black femora.

Male.—Length 6 mm. Frontal triangle dull-gray pollinose, with a few black hairs on the lower portion; lower corners of the frons and the face silvery gray pollinose. First two antennal joints dull yellow, with black bristles; first joint slender (third joint missing). Ocellar tubercle gray pollinose and with black pile. The mouth parts black, with white pile. Cheeks dull black just below the eye, with short black pile on this dark spot. Occiput silvery gray pollinose and white pilose.

Thorax black, gray pollinose, thinly so on the lateral margins; largely dark-brown erect pilose, with some reclinate yellow pile and a few erect white hairs. A median dark-brown vitta is present as in *haemorrhoidalis*, and on either side a whitish vitta. Scutellum gray pollinose and white pilose, with four black marginal bristles. Pleura and coxae as in the other species of the *haemorrhoidalis* group. Knobs of the halteres blackish brown, the stems yellowish brown.

Abdomen black, the first segment gray pollinose except for a small posterior angle; dorsum of second to sixth segments dense silvery pollinose and white pilose; lateral margins of second, third, and fourth segments largely shining black; venter silvery gray pollinose and white pilose. Genitalia yellow, largely yellowish pilose; some black pile on the genitalia and sixth segment. Femora and most of tarsi black; the knees, tibiae, except apices, and base of tarsi yellowish red. Wings hyaline, veins yellow at the base, brown beyond the basal half, the stigma brown; a brown spot outside the small cross vein, curving around the outer end of cell first M–2; cell M–3 closed and petiolate.

Female.—Length 8 mm. Very nearly like the female of *notata*, but differing in the coloring of the antennae and the legs. The

shining black callosity of the frons quite convex and reaching to the ocellar tubercle (fig. 58); ocellar tubercle and vertex gray pollinose. A few short black hairs on the upper third of the frons and just above the antennae.

Thorax and legs as in the male, the pile on the dorsum of the thorax shorter, the reclinate yellow pile more noticeable. Halteres blackish brown. Spot at end of cell first M–2 very faint. Abdomen shining blackish brown, the first segment largely gray pollinose, a silvery spot on the posterior angles of second and fifth segments; posterior margin of second and third segments white, above the white on the second segment a narrow border of silvery pollen.

Type locality.—Chiricahua Mountains, Arizona, May 30 (H. G. Hubbard).

Type.—Male, Cat. No. 25932, U.S.N.M.

The types are rather imperfect specimens. There are two female paratypes in the collection of the California Academy of Sciences, taken June 20, 1916, in Mormon Canyon, Arizona. In both of these, as in the types, the third antennal joint is missing. The unusual yellow color of the first two antennal joints will easily distinguish the species.

PSILOCEPHALA JOHNSONI Coquillett.

1893. *Psilocephala johnsoni* COQUILLETT, Can. Ent., vol. 25, p. 228.

The type is a unique female, in C. W. Johnson's collection. A female loaned for study by Mr. Johnson seems to be scarcely distinguishable from *P. notata* Wied. It is reported from St. Augustine and Ormond, Florida, in Aldrich's catalogue.

Type locality.—"Florida."

PSILOCEPHALA UNIVITTATA Bellardi.

1861. *Psilocephala univittata* BELLARDI, Saggio di Ditter. Messic., vol. 2, p. 90.

I have translated the original description, which is fairly complete, and from which the following notes are given:

Female.—Front bare, black, shining, on sides at base whitish gray pollinose; antennae black; occiput gray, gray pollinose; thorax black, longitudinally obsolete gray quadrivittate; halteres black.

Abdomen long, almost bare, black, shining; fifth segment obsolete gray pollinose. Femora black; tibiae and tarsi brown. Wings yellowish hyaline; veins faintly margined brown. Length 9 mm.

These are the most important parts of the description.

Type locality.—Puebla, Mexico.

Type.—Said to be in the collections of Saussure, Bigot, and Bellardi. The Bigot collection is now owned by J. F. Collin, Newmarket, England, and Bellardi's is in Turin, Italy.

Distribution.—Williston records this species in the Biologia Centrali America (vol. 1, p. 297) from specimens taken at Xucumanatlan,

Amula, and Omilteme, all in Guerrero, Mexico, and was doubtful whether the species was distinct from *notata* Wiedemann.

A male from Omilteme and one from Amula were loaned from the collection of the American Museum, and they seemed to represent a distinct species, much closer to *haemorrhoidalis* than to any other species; whether they are the true *univittata* or not it would be difficult to say, because of the many closely related species in this group.

PSILOCEPHALA SIGNATIPENNIS, new species.

Plate 8, figs. 93 and 103.

Male.—Length 6 to 7.5 mm. Head black; the face, a rim next to eye, cheeks, and lower corners of frontal triangle silvery white pollinose; most of the frons shining black and erect black pilose. Pile of occiput and palpi white; cheeks with short black hairs on a black spot below the eye; occiput semishining grayish black, with black bristles. Antennae black, more or less gray pollinose, especially the first two joints which are black bristled; a noticeable group of short black bristles at base of third joint. (Fig. 93.)

Thorax black, the large median portion gray pollinose, the sides and three narrow dorsal stripes semishining; pile of the dorsum erect and black. Scutellum black, semishining, the tip whitish, with four black bristles. Pleura black, the pteropleura shining, the rest and the coxae silvery gray pollinose and white pilose. Halteres entirely black.

Abdomen black, the dorsum of second to sixth segments shining silvery pollinose with sparse, fine white pile; first segment gray pollinose with rather long white pile at the sides; the lateral margins of the first, third, and fourth segments shining black, also the anterior part of the second and the venter, except faint gray pollen on the first two segments; pile of abdomen largely white, some black below on the sixth segment and on the genitalia. Genitalia mostly concealed in the last abdominal segment, brown and yellow in color with yellow pile above. (Fig. 103.) Legs in most specimens entirely black, femora with most of pile silvery white and erect; front femora with three black bristles inside and below. Wings whitish hyaline, stigma black, apex of wing usually gray, and a large brownish gray spot near the end of cell first M–2 which varies somewhat in size; cell M–3 closed near the margin.

Female.—Nearly like the male. Frons shining black and nearly the same as in the female of *platancala;* a small round depression just above and between and antennae and a depressed line above this. Cheeks below the eye dull black.

Mesonotum with very short reclinate black pile. Abdomen shining black, short reclinate black pilose on the first, second, and third segments, the rest of the abdomen and the genitalia short erect black

pilose; the narrow posterior margin and the posterior corners of second segment silvery white; white pile on the silvery parts and on the lateral margins of first segment; a silvery spot on each side of the fifth segment. The apical gray-brown marking in the wing more extended.

Type locality.—Hood River, Oregon, July 3, 1917, on strawberry plants (F. R. Cole).

Type.—Male, Cat. No. 25933, U.S.N.M.

What appears to be a variety of this species occurs in southern California. The front tibiae are brown at the base and the others largely yellowish; the basal joints of the tarsi are more or less yellowish. The central wing spot is much reduced and the apical spot missing. The species is very close to *platancala* Loew.

Paratype.—There are 10 males and 18 females, distributed as follows:

Oregon: Hood River, July 3 (Cole), [Cole].

California: Los Angeles, April 29 (M. C. Van Duzee), [C. W. Johnson]; Colton, May 26 (E. P. Van Duzee); South Fork, Kings River Canyon, altitude 5,000 feet, Fresno County, July 4 (E. C. Van Dyke); Sobre Vista, Sonoma County, May 8 (J. A. Kusche); El Cajon, San Diego County, April 28 (E. P. Van Duzee); Shasta Springs, June 13 (C. L. Fox), [all Cal. Acad. Sci.]; Compton, April 15 (Cole); Redlands, May and June (Cole), [Cole].

PSILOCEPHALA PLATANCALA Loew.

Plate 6, fig. 44; plate 7, fig. 76; and plate 8, fig. 90.

1876. *Psilocephala platancala* Loew, Zeitschr. Ges. Naturwiss., new ser., vol. 14, p. 321.

Female.—Length 8 to 9 mm. Black, partly gray pollinose. Vertex gray pollinose and a very narrow margin of frons next the eye. Face silvery pollinose; frons shining black, the shining portion reaching slightly beyond the base of the antennae. (Fig. 44.) Antennae black, third joint slightly longer than the first and slightly broader, all the antennal joints gray pollinose. A few minute black hairs just above the antennae. Palpi black or blackish brown, with black pile. Occiput gray pollinose, the pile below white.

Thorax and scutellum black, the mesonotum, pleura, and scutellum gray pollinose; sides of mesonotum thinly pollinose or semishining, the pollen of pleura silvery gray. A very faint median brownish stripe on mesonotum. Scutellum with four black bristles. Knob of halteres black, the stem blackish brown.

Abdomen almost wholly shining black, first segment and base of second thinly gray pollinose; posterior margin of second and a very thin line on posterior margin of third sternite silvery gray pollinose;

a silvery gray pollinose spot on sides of fifth segment. Base of abdomen with a few whitish pile, the rest of abdominal pile short and black. First two tergites thinly gray pollinose, posterior margin of the second white, the rest of venter shining black. Front legs black except reddish color at base of tibiae; all femora black, the four hind tibiae and metatarsi reddish yellow with blackish tips, second tarsal joint yellow basally, the last three joints blackish. Wings faintly infuscated and with a yellowish tinge, the apex and margins of veins in apical half of wing darker (fig. 76); stigma brown; a hyaline spot at base of cell R–1 and subcostal cell; wing veins brown, yellowish toward the base.

Male.—Length 7 mm. Smaller than female and with more gray pollen on the body. Frontal triangle shining black, narrowly silvery on the sides, with numerous black hairs, in some specimens as long as the first antennal joint.

Thorax and scutellum entirely gray pollinose, thinly so on the sides of mesonotum so that the shining black shows through; pile rather long, erect, whitish, and pale brownish. Pteropleura semishinning, the other pleura densely gray pollinose. Halteres blackish brown, the knobs large.

Dorsum of abdomen densely silvery pollinose, reclinate white pilose above, longer and erect on the sides and venter; the sides of segments two to five shinning black at the base; venter on first three segments gray pollinose, the base of second shining, fourth to seventh semishining, thinly pollinose; sixth segment about four-fifths as long as the fifth, the seventh very short, it and the genitalia rather long black pilose. The genitalia has some short yellowish pile, is reddish in color, and covered largely by last segments of abdomen.

Type locality.—Texas.

Type.—In the Museum of Comparative Zoology at Cambridge, Massachusetts.

Distribution.—The distribution according to 12 males and 10 females examined is:

Pennsylvania: North Mountain, June 8 [C. W. Johnson].

Kansas: Morton County (F. H. Snow), [Kans. U.].

Texas: El Paso, July 23 (J. C. Bradley), [Cole].

Colorado: Fort Collins, August 3 [C. W. Johnson]; Denver, July 26 (E. C. Jackson), [Biol. Surv.]; a series with no other data, determinded by Kröber as *haemorrhoidalis* [U.S.N.M.]; Boulder, June 21 (T. D. A. Cockerell); Rocky Ford, August 28, "bred with *Loxostege*" [both Cole].

Arizona: Tuscon (F. H. Snow); Douglas, August (F. H. Snow), [both Kans. U.].

PSILOCEPHALA COSTALIS Loew.

Plate 6, fig. 63; plate 7, fig. 74; and plate 8, fig. 99.

1869. *Psilocephala costalis* Loew, Berl. Ent. Zeitschr., vol. 13, p. 11.

Male.—Length 5 to 6 mm. Closely resembling *P. signatipennis* and *platancala*, yet differing distinctly from any of the species in the *haemorrhoidalis* group. Frontal triangle shining black in the middle, but not so widely so as in *signatipennis* and with a few short black pile. First antennal joint gray pollinose and almost as long as the third, with black bristles and pile; some of the bristles half as long as the first joint. Occiput largely shining black, the eye margins gray pollinose. Pile on the lower part of the head white, except the short black pile on the usual black spot below the eye.

The mesonotum is largely shining black, the median shining stripe very broad; on either side a broad gray pollinose stripe which reaches to the scutellum. Pile of mesonotum fine, erect, and blackish, in some specimens with considerable white pile intermixed. Scutellum black, gray pollinose on the posterior margin, white pilose, and with four black marginal bristles. Pleura and coxae black, gray pollinose and white pilose. Halteres blackish, the stem brownish at the base.

Abdomen shining black; dorsum of the second to the fifth segments dense silvery pollinose, the pile white, reclinate above, longer and more erect on the sides and venter. External genitalia small (fig. 99), black, the pile largely black; some of the internal structures reddish. Second abdominal segment with a white posterior border above and below. The venter and sides of the segments shining black. Legs usually entirely black, occasionally with the bases of the four hind tibiae and tarsi dark reddish. Pile of the femora white. Front tibiae and tarsi slightly swollen, the first tarsal joint shorter and thicker than on the hind legs. Wings with a faint dark spot in the base of cell R–5, the costal and marginal cells and stigma blackish brown, the wings otherwise hyaline. (Fig. 74.)

Female.—Length 6 to 7 mm. Closely resembling the male. Frons shining black except for the lower corners (fig. 63) and slightly convex; the ocellar tubercle shining black. Pile of mesonotum very short and sparse, blackish in color. Superimposed on the broad gray vittae are two narrow white stripes near the inner edges of the gray. Posterior margin of the scutellum dense silvery gray pollinose. Abdomen largely shining black; the white posterior border on the second segment quite broad and with a line of silvery gray pollen lying anterior to it; sides of the fifth segment with a silvery gray spot. Pile of the abdomen very sparse, whitish on the basal two segments and black on the remaining segments. The apical half of the wing is more or less clouded, more strongly so along the veins.

Type locality.—California.

Type.—In the Museum of Comparative Zoology at Cambridge.

Distribution.—The distribution according to six males and eight females examined is as follows:

Washington: Wenass Valley, Pressey's, July 6, 1882 [M. C. Z.].

Nevada: Ormsby County, July 6 (C. F. Baker), [Stanford Univ.].

California: Santa Paula [Cornell]; no data (Osten Sacken), [M. C. Z.]; San Diego, April 19 (F. E. Blaisdell); Sisson, July 25 (E. P. Van Duzee), [both Cal. Acad. Sci.]; mountains near Claremont (C. F. Baker); Claremont (C. F. Baker); Laguna Beach (C. F. Baker), [all Pomona College]; Concord, August 23 (M. C. Lane),[Cole]; Santa Clara (Harkins), [Stanford Univ.].

PSILOCEPHALA ARGENTATA (Bellardi).

1861. *Thereva argentata* BELLARDI, Saggio di Ditterol. Messic., vol. 2, p. 90.

From the fairly comprehensive original description one would judge that this species is very close if not identical with *P. platancala* Loew. Williston redescribed the species from a male taken at St. Vincent, West Indies, and gave a poor figure of the antenna. Bellardi stated that the species was related to *Thereva anilis* of Europe, but this species is now placed in the genus *Dialineura*.

Type locality.—Cordoba, Mexico.

Types.—When described the types were in the collections of Bellardi and Saussure. Bellardi's collection is in Turin, Italy.

PSILOCEPHALA NIGRIMANA Kröber.

1912. *Psilocephala nigrimana* KRÖBER, Stett. Ent. Zeit., p. 238.

From the description this would appear to be the same as *platancala*, and it comes from a locality where one would expect to find *platancala*. But Kröber determined a series of *platancala* sent to him from the National Museum as *haemorrhoidalis*. A specimen collected at Claremont, California, and loaned by the National Museum for study, was determined by Kröber as *Psilocephala* near *nigrimana;* the specimen is a paratype of *signatipennis* described above. Collecting in the type locality will eventually determine the status of the species.

Type locality.—Pueblo, Colorado.

Type.—In the Hofmuseum in Vienna.

PSILOCEPHALA ALDRICHI Coquillett.

Plate 5, figs. 38 and 39; and plate 6, fig. 42.

1893. *Psilocephala aldrichi* COQUILLETT, Can. Ent., vol. 25, p. 227.

There has been some confusion as to the identity of this species owing to the lumping of two distinct species by Coquillett. Mr. Johnson loaned the cotype of the form found in New Jersey, and it is

quite distinct from western specimens; this eastern form has been given a new name, *flavipennis*. The color of the halteres is one of the characters differentiating the two forms; in the western form they are bright lemon yellow, in the eastern species pale brown. The cotypes in the National Museum are all of the western form, which has been designated as the true *aldrichi*. There seems to be a slight difference in the California and Northwestern specimens, and it is quite possible that Coquillett's original series will have to be split again when more specimens are studied from both localities.

The following notes are made from specimens taken in Oregon, Washington, Idaho, Montana, western Canada, and California:

Male.—A few minute black hairs on the frons above the antennae; cheeks dull black. In most specimens the thorax is very faintly pollinose, almost shining black; pile reclinate yellow and erect whitish or yellowish white, the two vittae very faintly perceptible, if at all. Base of the scutellum shining, the apical half whitish pollinose. Lateral margins of the abdominal segments beyond the first broadly shining black; second and third segments with white posterior borders; fifth, sixth, and seventh segments very short, the seventh scarcely visible. Genitalia reddish, with reddish yellow pile. The tibiae are reddish yellow with black apices.

Female.—Unusally 1 to 2 mm. longer than the male. Ocellar tubercle and usually a short strip on each side gray pollinose, but most of the frons shining black (fig. 42), much as in *P. frontalis* Lower occiput shining black except a white rim next to the eye. Thoracic vittae very distinct; pile of the thorax and scutellum yellowish, very short and sparse; pile before the halteres shorter than in the male. First abdominal segment with some gray pollen, the other segments shining black, with erect black pile beyond the third segment. Wings darker than in the male, with a yellowish gray tinge.

Type localities.—New Jersey, Montana, Wyoming, and California.

Cotypes.—Male and female, Cat. No. 10414, U.S.N.M.; others in C. W. Johnson's collection.

Distribution.—The following localities are given from a study of 26 males and 18 females.

Canada: Aweme, Manitoba, July 11 (Criddle), [A. N. S. P.]; Vancouver Island (H. Edwards), [Amer. Mus.].

Wyoming: Torrey's Lakes, September 7 [Amer. Mus.]; Niobrara County, August 22 (E. G. Holt), [Biol. Surv.].

Colorado: Denver, August (E. S. Tucker), Coq. det. [Kans. U.].

Montana: Gallatin County, July 18, elevation 5,500 feet, and August 15, elevation 6,000 feet; Missoula, August 17; Musselshell, August 17 [all Mont. Exp. Sta.].

Idaho: Boise, June 13 (Fisher), [Biol. Surv.]; Malad, June 20 (Cole), [Cole]; Lewiston (C. V. Piper), [R. C. Shannon].

Washington: Wapato, May 11 (Cole), [Cole]; Ritzville, June 12 to September 9; Sprague, June 20 and Medical Lake, July 14 (all R. C. Shannon), [Shannon].

Oregon: Forest Grove, July 12 (Cole); Hood River, June 20 (Cole), [both Cole].

California: Stanford University, May [Stanford U.]; Bradley, May 22 (E. P. Van Duzee); Berkeley, September 13; Sisson, July 24 (E. P. Van Duzee); Santa Rosa Island, May 20 (E. P. Van Duzee), [all Cal. Acad. Sci.]; Stanford University, May 20 (Cole); Perkins (W. B. Parker); sand dunes near Golden Gate Park, San Francisco, May 25 (Cole), [all Cole].

PSILOCEPHALA LAEVIGATA Loew.

Plate 6, fig. 55.

1876. *Psilocephala laevigata* LOEW, Zeitschr. f. d. Ges. Naturwiss, new ser., vol. 14, p. 319.

Type locality.—San Francisco, California.

The type is in the Museum of Comparative Zoology at Cambridge, Massachusetts.

This species is doubtfully separated from *aldrichi;* there are apparently constant though slight differences in the females, but the males are hard to distinguish. When larger collections are made of both sexes in certain localities the species can be straightened out. The females are distinguished from *aldrichi* by the darker wings and wing markings and by having the upper half of the frons gray pollinose. (Fig. 55.) There are no doubt slight differences in the male genitalia, but these are microscopic and largely internal, or obscured by the outer plates.

Distribution.—Two males and five females were examined, all from California.

There are four females in the Pomona College collection, collected at Claremont, California, by C. F. Baker; one female taken at Redlands, California, by the writer. The two males were taken, presumably, at about the same time as the four females, one specimen in the mountains near Claremont, California; no dates are given. More collecting around Claremont is necessary before describing the male of this species.

PSILOCEPHALA LATERALIS Adams.

Plate 6, fig. 62.

1904. *Psilocephala lateralis* ADAMS, Kans. U. Sci. Bull., vol. 2, p. 444.

Female.—Length 7.5 to 10.5 mm. Closely related to *laevigata,* the head much the same. Vertex gray pollinose; frons smooth, shining black, gently convex, the lower corners silvery white (fig. 62), face silvery pollinose. Antennae black, first two joints thinly gray pollinose, with a few black bristles; first joint about as long as the third

and of nearly the same width. Cheeks black, with short black pile. Occiput silvery gray pollinose, white pilose, with black bristles.

Dorsum of thorax and scutellum densely silvery gray pollinose, sparse reclinate yellowish white pilose. In certain lights there is a brownish caste to the mesonotum. Broad lateral margins of the thorax and margin of scutellum shining black; scutellum with four marginal bristles. Pleura largely silvery gray pollinose, white pilose, the pteropleura semishining black Halteres bright yellow, the base of the stem light brown.

Abdomen shining black, first segment silvery gray pollinose, a narrow posterior rim on the second and third, and spots on the sides of the fifth silvery. Reclinate white pile on the first three segments, longer on the first; beyond the third segment short erect black pilose as usual. Venter gray pollinose on the first three segments. Fore legs black, also the four hind femora; the middle and hind tibiae reddish, darker at the tips; the middle and hind tarsi largely reddish, black apically; bristles of the legs black. Wing veins yellow and brown, the wing membrane yellow at the base, beyond this largely pale grayish brown; costal cell and stigma yellow; cells near the base of wing largely hyaline; cell M–3 closed near the wing margin.

Type locality.—Bill Williams Fork, Arizona.

Type.—In the Kansas University collection.

Distribution.—The distribution according to three females is: California—Compton; Los Banos, May 22 (E. P. Van Duzee), [Cal. Acad. Sci.]; Claremont (Baker), [Pomona College].

The writer first described the species as new, but Kröber's redescription of both sexes in his 1914 paper clearly places the species. It is near *aldrichi* and *laevigata*, and is recorded by Kröber from Death Valley, California, and Colorado.

PSILOCEPHALA MUNDA Loew.

Plate 6, fig. 46; plate 7, fig. 73; and plate 8, figs. 81 and 96.

1869. *Psilocephala munda* Loew, Berlin. Ent. Zeit., vol. 12, p. 9.
1869. *Psilocephala melanoprocta* Loew, male, described in the same publication, p. 11.

Male.—Length 7 to 8 mm. Head, including antennae, palpi, and proboscis, black. The antennae short, third joint longer than the first two combined and considerably wider, tapering and with a small style (fig. 73); strong bristles of first two antennal joints black. Occiput gray pollinose above, white below. Cheeks, occiput, and palpi white pilose, the vertex with black pile; face and large frontal triangle silvery white pollinose.

Thorax black, the mesonotum dull, gray-black with two narrow white vittae, lateral margins gray pollinose; pile erect, mixed black and white. Two pairs of praescutellar bristles and four bristles on the

margin of the scutellum. Scutellum white pollinose and pilose. Pleura and coxae dense gray-white pollinose, with white pile, very long and thick before the halteres. Halteres blackish, the knob very large, somewhat paler on the sides, and faintly gray pollinose.

Abdomen black, densely silvery white pollinose and white pilose. Genitalia large and mostly shining black, the epiproct much longer than the hypandrium (fig. 96), sometimes reddish at the tip, with thick black pile, longer below. Femora black, with erect and also reclinate silvery white pile; basal half of tibiae and extreme base of tarsi yellowish brown, apical half of tibiae and most of tarsi blackish; fore tibiae with very little yellowish at the base; four front femora without bristles. Wings hyaline, the veins strong and black; stigma brown; cell M–3 closed near margin of wing. (Fig. 73.)

Female.—Much as in the male. Length 8.5 to 9.5 mm. About two-thirds of the frons shining black, more or less striated, the lower third silvery white pollinose (fig. 46); a few minute black hairs on the shining portion. First two antennal joints and base of third gray pollinose.

Thoracic vittae wider than in male, very conspicuous, fading into gray in front and before the scutellum; the white pile of thorax and scutellum less dense and confined to margins of mesonotum; the larger part short erect blackish brown pilose. Knobs of halteres appear white due to the covering of pollen; there is some yellowish color on the sides and gray beneath.

Abdomen largely shining black; sides of first and wide posterior margins of second, third, fifth, except a posterior triangle, and sides of sixth silvery white pollinose; seventh and eighth segments shining black. Pile at base of abdomen white, long at sides of first segment, beyond the fourth segment erect and black; venter mostly silvery white, darker toward the tip, the last two segments shining. Circlet of blunt spines on genitalia brown. Legs and wings as in the male.

Kröber was of the opinion that *melanoprocta* Loew was the male of *munda* Loew, and this has been proven beyond doubt in looking over several collections. The species has been reported from Pullman and Coupeville, Washington; Colorado; Wisconsin; Maine; New York; Montreal and Hudson Bay Territory, Canada.

Type locality.—Wisconsin (Kennicott).

Type.—In the Museum of Comparative Zoology at Cambridge, Massachusetts.

Distribution.—The distribution according to 35 males and 30 females is:

Canada: Montreal, Quebec, June [Kans. U.]; Ottawa, Ontario, August 29 (Beaulieu); Ottawa, May 25; Ottawa, August 26 (C. B. Hutchings); Sudbury, Ontario, June 22 to August 10; Cowley, Al-

berta, June 20 to 28 (R. N. Chrystal); Banff, Alberta, August 7 (N. B. Sanson); Prince Albert, Saskatchewan; Corcross, Yukon Territory, July 25 (A. P. Hawes); Kaslo, British Columbia [all Canad. coll.]; Vancouver, British Columbia, June 8; Cranbrook, British Columbia, July 26; Penticton, British Columbia, July 7 (E. M. Anderson), [all R. S. Sherman]; Fort Rae, Mackenzie, July 27 (E. R. Preble), [Biol. Surv.].

New York: North Elba, July [Amer. Mus.]; Ithaca, May; Adirondack Mountains, Axton, June 12 (A. D. MacGillvary), [Harrisb. coll.].

Pennsylvania: Rockville, May 10 [Harrisb. coll.].

Minnesota: St. Anthony Park, September 27 and July 18 [U. Minn.].

Michigan: Agricultural College, May 11 [Cornell].

Colorado: Manitou, August 18 (Osten Sacken), [M. C. Z.]; Denver, June 16 (J. S. Hine), [Hine].

Montana: Gallatin County, July 18; Judith Basin, June 6; Boseman, June 17 to July 3 [all Mont. Exp. Sta.].

Washington: Pullman, June 9 to August 2 (Cole); Molson, June 8 (A. C. Burrill), [Cole]; Forks, Clallam County, July 1 (E. P. Van Duzee), [Cal. Acad. Sci.].

Oregon: Multnomah Falls, September 30 (Cole), [Cole].

California: Muir Woods, May 9 (E. C. Van Dyke), [Cal. Acad. Sci.].

PSILOCEPHALA ARGENTIFRONS, new species.

Plate 6, fig. 64; plate 8, figs. 94 and 100; and plate 13, fig. 174.

Male.—Length 8.5 mm. Resembles *P. munda* in general appearance. Head black, the frons silvery gray pollinose, the upper corner of the triangle dull black. (Fig. 64.) Antennae rather short, the third joint longer than the first (fig. 94), black, with black bristles and pile; a few black hairs above each antenna. Face silvery white pollinose. Occiput, white pollinose and pilose. Proboscis and palpi black, white pilose; a few black hairs at the lower corner of the eye; bristles of occiput black and strong.

Mesonotum, pleura, and scutellum black, gray pollinose; two whitish gray longitudinal vittae on the dorsum of thorax, which is blackish gray, paler on the margins and before the scutellum; erect fine black pile in the median portion of the dorsum, white around the margins; pleura and coxae gray pollinose and white pilose; bristles of thorax black; middle of scutellum, space between thoracic vittae, and lateral margins of mesonotum semishining. Halteres blackish, the knob gray pollinose.

Abdomen black, silvery gray pollinose, the silvery white pile longer on the first three segments, shorter and reclinate on the fourth, fifth, and sixth; seventh segment and the genitalia black pilose; second segment with a white posterior margin. Genitalia blackish, the upper forceps much larger than the hypandrium. (Fig. 100.) Legs entirely

black, the femora with silvery white pile, short and reclinate on the hind pair, on the front femora longer, more erect, and reaching only two-thirds of the way to the tip. Wings hyaline, the veins and stigma black; cell M–3 wide open.

Type locality.—Holotype, a male, bred out at Rockville, Pennsylvania, May 30, 1919 (A. B. Champlain).

Type.—In the Harrisburg collection, Pennsylvania Department of Agriculture.

This species may prove to be the same as *melampodia* Loew, of which the male is not known. The antennae are about the same as in *melampodia* and the legs and wings are alike.

Larva.—Length 26 mm. The larva of this species does not have the rows of indentations characteristic of *P. frontalis* and *P. haemorrhoidalis*. On the dorsum of the penultimate segment there is a group of four small hairs in the form of a square; on the venter two small hairs near the apex of the penultimate segment. The internal prolongation of the mouth parts can be seen through the semitransparent chitin. There is a large spiracle on the thorax as in the other known species of the genus. A single slender spine on each side of the three thoracic segments and a single spine on each side of the head.

Pupa.—About 14 mm. in length. Pale brownish in color. The thorns on top of the head are shorter than in *P. frontalis* and those at the base of the wing are smaller in proportion. The thorax is large and quite convex above. (Fig. 174.) The dorsum of the first abdominal segment has 6 bristles above, and there are 8 on the sixth and seventh segments; on the other segments the number of spines varies from 10 to 12. The venter of segments 2 to 6 has six spines, three on each side. The last segment ends in a bifid spine.

PSILOCEPHALA GRANDIS Johnson.

1902. *Psilocephala grandis* JOHNSON, Can. Ent., vol. 34, p. 24, female.

This form is very near *P. canadensis*, the following species, but is larger and has the frons marked differently. No other specimens of this species have been reported since the discovery of the unique type.

Type locality.—Rouville County, Province of Quebec, Canada.

Type.—In the collection of C. W. Johnson.

PSILOCEPHALA CANADENSIS, new species.

Plate 6, fig. 53.

Female.—Length 10 to 12 mm. A species very nearly answering the description of *grandis* Johnson, but smaller and lacking the diverging black lines on the frons (fig. 53); the upper two-thirds of the frons is dull-brown pollinose, in rubbed specimens showing dull black in the middle; this upper, narrower portion of the frons has numerous short black hairs. The antennae are short, nearly as in

limata, black, thinly gray pollinose and with short black bristles on the first two joints. Lower half of frons and face silvery white pollinose. Pile of palpi and proboscis white. Occiput and cheeks whitish pollinose, lower half of occiput white pilose, as are the cheeks, the upper half with numerous black bristles.

Thorax black in ground color, gray pollinose, the dorsum with reclinate white pile and erect black pile; two distinct vittae and the lateral margins of mesonotum whitish gray, dividing the blackish gray dorsum into three parts. Scutellum black, thinly gray pollinose, more dense on the margin, with four black bristles. Pleura and coxae dense silvery gray pollinose, white pilose. Stem of halteres brown, base of the knob black, the outer portion whitish.

Abdomen black, shining, the first three segments white, reclinate pilose, longer on the sides of the first segment, beyond the third segment short erect black pilose as usual. First segment whitish gray pollinose on the sides; posterior angles of the second, third, fourth, all of fifth, and narrow lateral spots on sixth and seventh silvery gray pollinose; venter on first five segments silvery gray pollinose. Femora and apical joints of tarsi blackish; knees, tibiae except apices, and base of tarsi reddish; pile of femora white; all the leg bristles black. Wings with brown veins and stigma, the veins more or less faintly bordered brownish; cell M–3 wide open.

Type locality.—Trenton, Ontario, Canada, June 6, 1902 (Evans), [Canad. coll.].

Type.—Female, in the Canadian national collection at Ottawa.

There is a paratype in the Canadian collection taken at Ottawa, Ontario, June 3, 1912, and one female paratype in the collection of C. W. Johnson, taken at Montfort, Quebec, July 10, 1916. The species is related to *grandis* and *limata*, and would run to the latter species in Kröber's synoptic table. *P. limata* is a western species, is more densely pollinose, and the antennae are slightly different.

PSILOCEPHALA LIMATA Coquillett.

Plate 6, fig. 49; plate 7, fig. 71; plate 8, figs. 86 and 101; and plate 13, fig. 173.

1894. *Psilocephala limata* COQUILLETT, Journ. New York Ent. Soc., vol. 2, p. 99.

General body color black, gray pollinose, mostly white pilose; the tibiae largely reddish; wings hyaline.

Female.—Length 11 to 12 mm. Frons opaque brown pollinose and black pilose on the upper half (fig. 49), lower half and face bare and white pollinose; palpi brownish; pile beneath head, on cheeks, and on occiput white. Occiput gray pollinose, with black bristles. Antennae black, first joint gray pollinose, with black bristles, the third as long as the first and second combined and distinctly broader, the style about one-sixth as long as the third joint.

Thorax thickly dark gray pollinose, with two vittae and lateral margins light gray, the pile mixed black and white, the bristles black. Scutellum colored as thorax, with white pile and four marginal incurving black bristles. Pleura gray pollinose and white pilose, especially dense pile on the propleura. Stem of halteres yellowish, the knob largely yellowish but with a blackish base.

Abdomen black, first segment gray pollinose, second largely black, semishining, the posterior margin and sides gray pollinose, a narrow margin white; base of third, fourth, and fifth, and all of seventh segment shining black, the rest gray pollinose. First three segments with white pile, the last four with erect black pile as on the venter, which is wholly gray pollinose; genitalia black. Femora black, gray pollinose and white pilose; knees, basal two-thirds of front tibiae, three-fourths of hind tibiae, and bases of tarsi are yellowish brown. Wings hyaline, stigma pale brown; fourth posterior cell broadly open; wing veins dark brown.

Male.—Length 10 mm. Very nearly resembling the female. The eyes are contiguous for only a short distance, the frontal triangle large, silvery pollinose and with no sign of pile.

Vittae on mesonotum more definite than in the female and all the pile of thorax a little longer and more dense. In the two males examined there is a small, round, black spot at the base of the abdominal segments; the spot is near the middle and next the basal black border. Genitalia largely blackish and gray pollinose. All the pile of abdomen long and white, longer at the base; several black hairs beneath on the genitalia, the rest of the pile on the genitalia yellowish. (Fig. 101 for structure.) Legs almost entirely blackish in the typical specimen.

Pupa.—Length 12.5 mm. The color is yellowish; the thorns on the head and thorax rather short. Thorax not as highly arched as in *P. argentifrons;* beneath each spiracle along the sides of the abdomen there are two spines. First abdominal segment with six bristles above; there is a tendency to variation in the other rows of spines on the abdomen; on the last two segments there are 8 spines above and on the others from 10 to 12. On the venter of segments 2 to 7 there are 6 spines, 3 on each side, or at times 3 on one side and 4 on the other. The body ends in the usual bifid spine. (Fig. 173.)

Type localities.—Colorado and Washington.

Cotypes.—Females, No. 10419, U.S.N.M.

The neallotype male is in the collection of R. S. Sherman and was collected in the Hope Mountains, British Columbia, July 21, 1919 (Sherman).

The female listed below from Bear Valley, California, was bred from a pupa taken from an old pine log. The female from Colorado

has the femora brownish and would not run to *limata* in Kröber's table of species.

Distribution.—The distribution according to two males and five females examined is:

Canada: Lillooet, British Columbia (A. W. Phair), [Canad. coll.]; Savary Island, British Columbia, July 12 (R. S. Sherman), [Sherman]; Vancouver, British Columbia, July (R. H. Chrystal), [Canad. coll.].

Colorado; El Paso County, July 12 (Champlain), [Harrisb. coll.].

California: Bear Valley, San Bernardino County, June (F. R. Cole), [Cole]; Fallen Leaf Lake, June 28 [Stanford Univ.].

PSILOCEPHALA MELAMPODIA Loew.

Plate 6, fig. 54; and plate 8, fig. 89.

1869. *Psilocephala melampodia* Loew, Berlin. Ent. Zeitschr., vol. 13, p. 9.

The original description is of a female. The mesonotum is black, with two narrow vittae and the lateral margins whitish gray pollinose. The antennae are like those of *munda* Loew. (Fig. 89.) The frons is semishining black on the upper part. (Fig. 54). The legs are wholly black.

Type locality.—Illinois.

Type.—In the Museum of Comparative Zoology at Cambridge.

Distribution.—Three females were examined from the following localities: Boston, Massachusetts, June 27 (Allston), [B. S. N. H.]; Black Mountains, North Carolina, May [Amer Mus.].

PSILOCEPHALA VARIEGATA Loew.

1869. *Psilocephala variegata* Loew, Berlin. Ent. Zeitschr., vol. 13, p. 170, male only.

Type locality.—"Canada."

Type.—In the Museum of Comparative Zoology, Cambridge.

The following notes are made from specimens examined by the writer:

Male.—The species seems unusually inclined to become greasy. The pile of the abdomen is not very dense, rather short, reclinate, white at the base, beyond the second segment yellowish, distinctly yellow on the hypopygium. The male genitalia are more nearly allied to *P. munda* in form than to any other species and are the same in the typical form as in the subspecies figured. The male specimen examined was 9 mm. in length.

Female.—Length 8.5 to 10.5 mm. Almost entirely whitish gray pollinose. Frons very broad, flattened, whitish gray pollinose, with a shallow impression in the central portion, in which some minute yellowish tomentumlike pile is visible; a few short black pile on the upper portion of the frons. Bristles of the occiput mixed yellow

and brown. Antennae of about the same structure as in the male, the first two joints gray pollinose, with a few short yellow pile. From the antennae to the eye margin a dark-gray stripe as in *Dialineura*, species. Pile of the cheeks and occiput white.

Thorax with a broad, dark-gray median vitta, narrowed considerably toward the scutellum; on either side of the median stripe an elongate spot of the same color. Scutellum gray pollinose, with four marginal black bristles. Pile of the mesonotum and scutellum short, reclinate, yellowish. Pleura grayish white pollinose, some yellow pile above, the most of the pile white.

Abdomen on the first six segments largely whitish gray pollinose, a dull brown mark at the base of second and third, the base of the fourth very narrowly brown. Pile of the first three segments whitish, short, erect, and black on the other segments. The circlet of spines at the tip of the abdomen black. Wings and legs as in the male. Cell M–3 may be narrowly or broadly open in the margin of the wing.

Neallotype.—I have selected as a neallotype a female specimen collected at Fort Erie, Ontario, Canada, July 4, 1910 (M. C. Van Duzee), [Van Duzee].

A larger specimen was taken at Ridgeway, Ontario, June 18, 1911 by Mr. Van Duzee and s in the collection with the type. This specimen is more or less greased, and the markings not clear. In one wing of this specimen the cell M–3 is closed in the margin, in the other wing narrowly open. A specimen loaned by Mr. C. W. Johnson was collected at Oswego, New York, June 16, 1896, and is somewhat greased and faded, but typical of the species. The male specimen examined was taken at Ridgeway, Ontario, Canada, July 7, 1912 (M. C. Van Duzee), [Van Duzee].

PSILOCEPHALA VARIEGATA OCCIDENTALIS, new subspecies.

Plate 7, fig. 78, and plate 8, fig. 102.

Length 8 mm. Three male specimens collected in Oregon differ slightly from the typical form. The female of this form is not known. The male genitalia are externally of the same structure as in *variegata*, but the pile is black instead of yellow. Pile of the antennae and the post-ocular bristles black. Pile of head, thorax, coxae, femora, and abdomen rather short and silvery white. The scutellum has silvery pile and four black marginal bristles. The wing membrane is more gray than whitish.

Type locality.—Corvallis, Oregon, June 4,1897 (collector unknown).

Type.—Male, in the California Academy of Sciences.

Two male paratypes were examined, both taken by the writer at Hood River, Oregon, May 5, 1918; one of these is deposited in the National Museum (Cat. No. 25941).

PSILOCEPHALA VARIEGATA FLAVIPILOSA, new subspecies.

Plate 6, fig. 59, and plate 8, fig. 80.

Male.—Length 8 mm. Pile of the antennae black. Bristles of occiput black, the pile yellowish; pile of cheeks white. Tomentum-like pile of mesonotum and scutellum yellowish. Only the central pair of scutellar bristles present. Pile of the pleura and femora yellowish. There is a large basal brown spot on the dorsum of the second, third, and fourth abdominal segments, larger on the fourth. The abdominal pile is yellowish. External structure of the genitalia as in *variegata*, the pile, however, largely black; points of the hypandrium with a tuft of black pile. Cross veins and the fork of Rs distinctly clouded brown; cell M–3 narrowly open.

Female.—First joint of antennae unusually thick (fig. 80) as in the genus *Tabuda*, the bristles and pile black. Pollen of the broad frons yellowish, darker on the upper two-thirds and with short black pile. The mark from the base of the antennae to the eye very distinct. Pile of the head, including proboscis and palpi, yellowish. Face and occiput whitish pollinose. Central portion of mesonotum and base of scutellum with a brown tinge to the pollen, the pile tomentumlike and brassy yellow. Two scutellar bristles as in the male. Base of the second and third abdominal segments brown above, the fourth almost wholly brown, the sixth brownish, the last segment shining black. Pile of the first two segments and part of the third reclinate yellowish, otherwise short, erect black pilose. Pollen of the abdomen outside the dark spots yellowish white and not grayish white as in the typical *variegata*. Cell M-3 almost closed in the margin of the wing.

Type locality.—Collected at Paso Robles, California, April 26,1919 (E. P. Van Duzee).

Type.—One male, in the collection of the California Academy of Sciences; allotype, female, in same collection.

Only the two type specimens are known. Further collecting may show this to be a good species, as the two scutellar bristles and the very large first antennal joint may be constant characters.

PSILOCEPHALA FUSCIPENNIS, new species.

Plate 6, fig. 65.

Female.—Length 9 mm. This species is in most particulars very closely related to *P. variegata*. The antennae are as in *P. variegata*, but both pile and bristles are black. Lower third of frons silvery gray pollinose and bare of pile, the upper two-thirds darker and with a brownish tinge, with short black pile, very dense and unusually small in the central portion. (Fig. 65.) Bristles of occiput black.

Occiput, cheeks, and face whitish pollinose, with white pile. A dark streak from the base of the antennae to the eye margin as in *variegata*.

Mesonotum gray pollinose around the margins, the larger portion dark brown; a faint pale median vitta, very narrow, and two distinct but narrow gray vittae, one on either side of the central stripe. Most all of the pile of the mesonotum very short, reclinate, and black, so that to the naked eye the mesonotum appears blackish; some short reclinate yellowish pile around the margins. Scutellum gray pollinose, darker at the base, with reclinate yellow pile and four black marginal bristles. Pleura and coxae black, silvery gray pollinose, with white pile. The halteres largely blackish, the base of the stem yellowish.

Abdomen black, largely gray pollinose; a basal blackish brown triangular mark on the second and third segments, running to the posterior margin, fourth segment largely blackish brown above, seventh segment brownish gray, the eighth shining black. First two segments with reclinate yellowish pile, the other segments with short, erect black pile. Femora black, gray pollinose, short white pilose; base of front tibiae yellowish, the apical two-thirds, and the tarsi blackish; four hind tibiae on the basal two-thirds and the base of the first tarsal joint yellowish, the rest of the legs black. Wings largely brownish gray, the centers of the cells whitish hyaline; stigma black; veins yellowish near the base of wing, black beyond; cell M-3 wide open.

Type locality.—Forks, Clallam County, Washington, July 2 (E. P. Van Duzee).

Type.—Female, in the collection of the California Academy of Sciences.

This species is very nearly related to the western subspecies of *variegata*, but the male when collected will undoubtedly be found to have black pile on the thorax and differences in the genitalia.

PSILOCEPHALA LUGUBRIS (Macquart).

1840. *Thereva lugubris* MACQUART, Dipt. Exot., vol. 2, p. 24, pl. 5, fig. 2.
1861. *Psilocephala nigra* BELLARDI, Saggio di Ditter. Messic., vol. 2, p. 92.
1863. *Thereva morio* RONDANI, Archivo per la Zool., vol. 3, p. 44.
1868. *Psilocephala penthoptera* SCHINER, *Novara* Reise, Dipt., p. 146.
1912. *Psilocephala lugubris* KRÖBER, Stett. Ent. Zeit., vol. 73, p. 237.

The species is not known from north of Mexico. Kröber redescribes the species in his paper on the North American Therevidae from specimens taken in Chile, Bolivia, and Mexico. The frons in the female is shining black with two cross impressions. The wings are largely blackish brown.

Type locality.—Chile.

Type.—In Museum of Lille, France.

PSILOCEPHALA SLOSSONI Coquillett.

1893. *Psilocephala slossoni* COQUILLETT, Can. Ent., vol. 25, p. 227.

The type is a female. No other specimens have been collected. The frons is grayish brown pollinose, with two velvet black spots at its middle and near the eye margins. The femora and tibiae are yellowish.

Type locality.—New Hampshire (Mrs. A. T. Slosson).

Type.—In C. W. Johnson's collection.

PSILOCEPHALA PLACIDA Coquillett.

Plate 6, fig. 45.

1894. *Psilocephala placida* COQUILLETT, Journ. New York Ent. Soc., vol. 2, p. 99.

The type female, is the only specimen known. The halteres and antennae are yellow and there are no black spots on the frons. The length is given as 12 mm.

In material from the collection of the Pennsylvania Department of Agriculture there was one female specimen very near this species. The specimen was collected at Reedsville, Pennsylvania, May 31 (C. Anderson). It is the specimen illustrated (fig. 45).

Type locality.—Florida.

Type.—Female, No. 10420, U.S.N.M.

PSILOCEPHALA MONTIVAGA Coquillett.

1893. *Psilocephala montivaga* COQUILLETT, Can. Ent., vol. 25, p. 226.

In describing the species Coquillett had one male and two females, taken in Los Angeles County, California. It is a yellow-legged species, with black pollinose spots on the frons of the female. In the male the abdomen is wholly silvery white pollinose, its pile wholly yellow.

Type locality.—Los Angeles County, California.

Type and allotype.—Male and female, No. 10413, U.S.N.M.

PSILOCEPHALA BACCATA Coquillett.

Plate 8, fig. 88.

1893. *Psilocephala baccata* COQUILLETT, Can. Ent., vol. 25, p. 226.

The types are in the National Museum. Coquillett's specimens were from Los Angeles and San Bernardino Counties, California. It is a species 5 to 7 mm. in length, wholly black in body color, including the halteres. The unusually short third antennal joint, the wholly black legs, and silvery white abdominal pile serve to distinguish the species. The antennae are shown in figure 88.

Type localities.—Los Angeles and San Bernardino Counties, California.

Type.—Male, No. 10411, U.S.N.M.

Distribution.—The two males examined were from the following localities: California—San Diego County (Harkins), [Stanford U.]; San Gabriel Mountains, southern California, June 5 (N. Banks), [M. C. Z.]

PSILOCEPHALA CINEREA, new species.

Plate 6, fig. 60; plate 7, fig. 72; and plate 8, fig. 95.

Male.—Length 6.5 mm. General ground color black, the abdomen with silvery white pile. Head black, the occiput and cheeks with considerable white pile; bristles of occiput black. Frons mostly white pollinose, the upper corner of the triangle dull black, with some black and white pile. Antennae short, black, the first joint slightly shorter than the third, with white pile above at the base and several black bristles. (Fig. 95.) Palpi yellow, with white pile.

Thorax black, gray pollinose, with reclinate white pile and longer erect black pile; two pairs of praescutellar bristles. Scutellum gray pollinose and white pilose, with four bristles. Pleura gray pollinose, the meta and mesa pleura long white pilose. Coxae gray pollinose and white pilose. Halteres mostly brownish yellow, base of knob blackish, the outer part whitish pollinose.

Abdomen black, gray pollinose, thickly clothed with silvery white pile. Genitalia largely yellowish, the upper lamellae large, with slender, pointed projections. Tibiae except apices and basal half of metatarsi yellowish, the rest of the legs blackish brown; femora with reclinate white pile; bristles of the legs black. Wings hyaline, veins pale, stigma yellowish; anal cell closed before the wing margin and cell M–3 closed in the margin. (Fig. 72.)

Female.—Length 7 mm. Much like the male. Face and lower part of frons white pollinose, upper frons dark gray pollinose, a dull black irregular crossband between the colors, which merges into a semicircular black spot on the eye margin. (Fig. 60.) Two rows of strong black bristles on the occiput, not obscured by pile as in the male. Black pile of thorax short and sparse, the reclinate pile also short and yellowish. Two narrow pale stripes on thorax. Abdomen black, the first segment and venter gray pollinose; second segment with white posterior border; posterior margins of second, third, fourth, and most of fifth and sixth gray pollinose. Pile of basal half of abdomen white and black, all white on first segment; on the apical half of abdomen short black erect pilose. Wings as in the male; cell M–3 very narrowly open in the margin.

Type locality.—Holotype, a male, and allotype, a female, collected at Alamogordo, New Mexico, April 30 and May 30, 1902.

Types.—In the Academy of Natural Sciences, Philadelphia.

This species would run to couplet 5 in Kröber's table of species and to *baccata* in the table of females. It is related to *baccata* and *pavida*. There are two paratypes, a male and female, in the collection with the types.

PSILOCEPHALA PAVIDA Coquillett.

Plate 6, fig. 51; plate 7, fig. 77; and plate 8, figs. 84 and 98.

1893. *Psilocephala pavida* COQUILLETT, Can. Ent., vol. 25, p. 226.

Type locality.—Los Angeles County, California.

Type.—Male, No. 10412, U.S.N.M.

The following notes are made from specimens taken in southern California:

Male.—Length 6 mm. On upper corner of frontal triangle there are two small but quite noticeable tufts of black pile. First and third antennal joints about equal in length, the first joint swollen and with unusually long black bristles. (Fig. 84.) Pile of cheeks, palpi, and occiput largely black.

Thorax and scutellum dark, almost blackish gray pollinose, with two light-gray, widely separated, vittae; the lateral margins of thorax and margin of scutellum light gray; scutellum with four marginal bristles. Mesonotum with reclinate yellowish tomentumlike pile and erect black pile; pile of scutellum yellowish. Pile of pleura and coxae largely whitish. Stem of halteres brown, base of knob blackish, the larger part of the knob whitish. The reclinate pile of the femora white, the erect pile black, especially noticeable on the two front pair. Genitalia black, characteristic in form (fig. 98), largely yellowish white pilose.

Female.—Length 6 to 7 mm. From the description much like the female of *baccata*. Pollen of upper two-thirds of frons yellowish gray, with numerous short black hairs; the lower part of the frons silvery white, two small velvet black spots at the junction of the two colors as in *baccata*. (Fig. 51.) Pile of occiput, cheeks, and palpi white. Bristles of antennae shorter than in the male.

Reclinate yellow pile of the thorax denser, the erect black pile shorter than in the male. Pile of pleura white. Pile of femora shorter than in the male; four hind tibiae and bases of four hind tarsi reddish brown.

Distribution.—The five males and eight females examined were from the following localities: California—Redlands, August and September (Cole); East Highlands, October (Cole), [Cole]; Santa Clara County (Harkins), [Stanford U.]; Laguna Beach, August (Baker), [Pomona College].

PSILOCEPHALA FESTINA Coquillett.

Plate 7, fig. 68; and plate 8, figs. 82 and 106.

1893. *Psilocephala festina* COQUILLETT, Can. Ent., vol. 25, p. 225.

This is a rather slender species, 5.5 to 7 mm. in length.

Type locality.—Florida.

Types.—In C. W. Johnson's collection.

Distribution.—The distribution according to three males and six females examined is:

Florida: Daytona, April 8 (C. W. Johnson), [Cole]; Bradentown, March (M. C. Van Duzee), [Van Duzee].

Arizona: Safford, July 14 (E. G. Holt), [Biol. Surv.].

Mexico: Dos Arroyos in Guerrero, Vera Cruz, September (H. H. Smith), [Amer. Mus.].

PSILOCEPHALA AURANTIACA Coquillett.

Plate 6, fig. 52; plate 7, fig. 70; and plate 8, figs. 91 and 104.

1904. *Psilocephala aurantiaca* COQUILLETT, Proc. Wash. Ent. Soc., vol. 6, p. 177.

Male.—Length 7 mm. Head black, the proboscis, palpi, and first two antennal joints yellowish, apex of third antennal joint brown, the style short. Very few bristles on the short antennae, the third joint a little longer and broader than the first. (Fig. 91.) Pile of occiput and cheeks white, the bristles of the former black.

Thorax, scutellum, pleura, and coxae black, the color more or less obscured by dense gray pollen. A few short reclinate yellowish hairs on the dorsum of thorax and scutellum, two apical converging bristles on the latter. There are faint suggestions of thoracic markings, a median double stripe and two elongate side spots. Pleura almost bare of pile, there being only a few hairs on the metapleura. Halteres yellow.

Abdomen almost an orange yellow on first four segments, darker on fourth, and above on first, the remaining segments black, including the genitalia. Posterior margins of first four segments narrowly white, with reclinate silver pile. All the rest of the abdominal pile black, reclinate, sparse on the first four and more dense on the apical segments; sides of first three segments silvery pollinose along posterior margins, also the narrow posterior rims of the fifth and sixth segments. Genitalia quite large, the hypandrium projecting some distance beyond the upper portion. (Fig. 104.) Legs blackish brown, the knees and extreme apices of hind femora yellowish. Wings faintly infuscated, darker along some of the veins and outer part of cell first M–2; anal cell closed near the margin of the wing; cell M–3 wide open (fig. 70); stigma pale brown.

Female.—Length 8 mm. Very near the male in general appearance. Frons rather narrow, not much wider than the ocellar tuber-

cle above, lower third silvery pollinose, the upper two-thirds brownish gray, with very short black pile; two small semicircular velvet black spots on the eye margin just above the silvery area of the frons. (Fig. 52.) The antennae darker than in the male. Thorax with a narrow median dark stripe. Abdomen much as in the male, the black pile from the fourth segment on is quite numerous and erect; there is some reddish color at the base of the fifth segment, the silvery posterior margin of this segment quite broad, and a lateral spot on the posterior margin of the sixth segment. Wings more hyaline than in the male; cell R beyond stigma pale brown and pale borders to veins R–4 and R–5 beyond the furcation.

Type locality.—Claremont, California (C. F. Baker).

I have selected as a neallotype a specimen taken at Alamogordo, New Mexico, May 15, 1902 [A. N. S. P.]

Type.—Male, No. 8035, U.S.N.M.

Distribution.—Among the specimens examined was a male taken at Alamogordo, New Mexico, May 15, 1902 [A. N. S. P.]; a male and female taken at the same place, June 2, 1902, and in the same collection. A male and female taken at Superstition Mount, Highley, Arizona June 13, 1917 (E. G. Holt), [Biol. Surv.].

PSILOCEPHALA SUBRUFA, new species.

Female.—Length 6.5 mm. Very near the preceding species. Differs in having the antennae pale yellow, with short black and yellow hairs; bristles of occiput, thorax, scutellum, and coxae yellow. The humeri, scutellum except base, praescutellar callosities, pleura, coxae and legs largely yellowish. Halteres yellow. Tips of tibiae, the last two tarsal joints, and apical portion of the first two brown. Bristles of legs black. Abdomen reddish yellow, short, sparse yellow pile on first segments, black pile on the remaining segments; a silvery spot on the posterior angles of the third and fifth segments. Wings infuscated about as in *P. aurantiaca* and the venation the same.

Type locality.—Holotype, female, collected at Highley, Arizona, June 13, on Superstition Mount (E. G. Holt).

Type.—In the collection of the United States Biological Survey.

This may be a color variety of *aurantiaca* Coquillett, as there are no apparent differences of structure in the females, but the male may prove to be different. The type is an unique specimen.

PSILOCEPHALA MORATA Coquillett.

Plate 6, fig. 40, and plate 8, figs. 83 and 105.

1893. *Psilocephala morata* COQUILLETT, Can. Ent., vol. 25, p. 225.

This species is near *festina* Coquillett. The antennae, female frons, and male genitalia are figured in this paper. The knob of the halteres

is whitish yellow. The femora are yellowish brown to blackish brown. Cell M-3 may be narrowly open or closed in the margin of the wing; in one specimen examined vein M-3 did not reach the margin of the wing. The length is 6 to 7 mm.

Type localities.—New Jersey and Florida.

Types.—In C. W. Johnson's collection.

Distribution.—The distribution according to three males and three females examined is:

New Jersey: Cape May, June 7 (Daecke), [Harrisb. coll.]; Ocean City, June 10 (C. W. Johnson), [Cole]; Ocean City, June 10 [M. C. Van Duzee].

Florida: Gotha, March [Amer. Mus.].

PSILOCEPHALA OCCIPITALIS Adams.

1904. *Psilocephala occipitalis* ADAMS, Kans. Univ. Sci. Bull., vol. 2, p. 443, female.

The type is the only specimen known. The antennae are yellow with a black tip and arista. The thorax, abdomen, and legs are yellow.

Type locality.—Bill Williams Fork, Arizona.

Type.—In the Kansas University collection.

PSILOCEPHALA MARCIDA Coquillett.

Plate 6, fig. 56, and plate 8, figs. 79 and 97.

1893. *Psilocephala marcida* COQUILLETT, Can. Ent., vol. 25, p. 228.

Male.—Length 7.5 to 9 mm. Black, largely gray pollinose, and white pilose. Pollen in the central part of the frontal triangle golden yellow, the rest white. Face yellowish pollinose. Palpi and proboscis yellowish, with white pile. Antennae yellow, rather short, the third joint onion-shaped, but laterally compressed (fig. 79), bristles very short and black, a few yellow pile on the first joint; arista short and black. Occiput and cheeks whitish pollinose and pilose; postocular bristles yellow.

Mesonotum gray pollinose, with short reclinate pile; two narrowly separated light-brown median vittae, abbreviated posteriorly; on either side two narrower and shorter stripes; the median vittae abbreviated anteriorly and hardly reaching the scutellum. Bristles of the thorax yellow. Scutellum gray pollinose, the margin yellowish in ground color and with four yellow marginal bristles. Halteres yellow, with some brown color on the knob.

Abdomen largely blackish gray in ground color, in some specimens the dorsum almost entirely yellow, gray pollinose; posterior margins of all segments yellow. Genitalia yellow, and yellowish pilose, the gonopods attached to the hypandrium long. (Fig. 97.) Venter with faint traces of yellow on the posterior margins of segments. Pile of

the dorsum silvery white, reclinate, more dense than on the venter. Coxae and femora largely brownish yellow, tibiae yellow with brownish tips, base of the tarsi yellow, the larger part brown; pile of the femora whitish. Wings whitish hyaline; stigma yellowish; the veins largely yellow; cross veins and fork of Rs black and faintly clouded, as are the veins closing the cell first A; cell M–3 closed and short petiolate.

Female.—Length 9 mm. Very nearly like the male in general appearance. Frons entirely yellow pollinose, very long and without markings (fig. 56), a few short black pile on the vertex. Mesonotum more uniformly brownish gray, the brown vittae not as distinct as in the male in the specimens examined; a few brown pile in addition to the white pile. Dorsum of abdomen largely yellow, the sides and venter largly blackish gray; thin pollen of abdomen gray; first four segments with reclinate white pile, the fourth with some erect black pile, the segments posterior to the fourth with short erect black pile. Genitalia and terminal circlet of spines yellowish. Legs entirely yellowish, the bristles blackish brown. Wings as in the male, the stigma brownish and the wings generally with a more brownish tinge.

Type locality.—Los Angeles and San Diego Counties, California.

Type.—Male, No. 10415, U.S.N.M.

I have designated as a neallotype a female collected at Coronado, San Diego County, California, July 9, 1890 (F. E. Blaisdell), [Cal. Acad. Sci.].

Distribution.—The distribution according to the seven males and three females examined is:

Arizona: Tucson, March 29 and April 8, Santa Catalina Mountains, 3 miles west of Sabine Canyon (J. F. Tucker), [Harrisb. coll.].

California: Santa Clara County, (Harkins), [Stanford U.]; Laguna Beach (Baker); Claremont (Baker), [both Pomona College]; Coronado, San Diego County, July 8 and 9 (F. E. Blaisdell); Oak Glen Lodge, San Bernardino County, 5,000 feet (F. Daggett), [both Cal. Acad. Sci.].

PSILOCEPHALA ACUTA Adams.

Plate 6, fig. 57; plate 7, fig. 67; and plate 8, fig. 87.

1903. *Psilocephala acuta* ADAMS, Kans. Univ. Sci. Bull., vol. 2, p. 222.

This species is easily recognized from the original description. There is a female in the Stanford University collection marked "type," probably a cotype, from which figures 57, 67, and 87 were made. The species is nearly related to *P. tergissa*, described below.

Type locality.—Englewood, Clark County, Kansas.

Types.—In the Kansas University collection.

PSILOCEPHALA TERGISSA (Say).

Plate 6, fig. 50, and plate 7, fig. 66.

1823. *Thereva tergissa* SAY, Journ. Acad. Nat. Sci. Phila., vol. 3, p. 39.
1828. *Thereva corusca* WIEDEMANN, Auss. Zw. Ins., vol. 1, p. 232.

Male.—Length 9 mm. Face golden yellow; frons silvery white below, golden brown above, the pile very sparse and minute. First and second antennal joints yellowish, third yellowish at base and brown at tip, the style black. Occiput golden brown above, silvery white below, the bristles black.

Thorax dark brown, with two darker vittae, the pile yellowish and sparse. Scutellum like the thorax. Pleura with whitish pollen.

Abdomen light brownish, semishining, with a silvery pollen above. Venter yellowish brown, with yellow incisures. The legs and wings are as in the female described below.

Female.—Length 8.5 to 9.5 mm. Resembling the male in many respects. The ocellar tubercle and upper half of the frons golden brown pollinose; just below the center, next each eye margin, a round velvet black spot (fig. 50); just above each spot a triangle of silvery pollen; the portion between the spots golden brown, below this silvery pollinose to the base of the antennae. Face and upper occiput yellowish brown pollinose, lower occiput grayish white pollinose; postocular bristles black; pile of lower occiput white. Third antennal joint yellowish, brown at the base and tip, the style black; pile and bristles of first two joints black; third joint laterally compressed, but slightly wider than the first and longer than the first and second combined.

Thorax, pleura, coxae, and scutellum yellowish or gray in ground color, with white pile. Mesonotum with four brown vittae and lateral brown spots; most of the pile reclinate whitish, a few erect, short black hairs. Scutellum with two marginal black bristles. Bristles of the thorax black.

Abdomen brown, semishining; pile of first three segments short, reclinate whitish, beyond the third segment erect and black as usual; posterior margins of the segments yellowish, in some specimens the whole dorsum more or less yellowish; first segment gray pollinose. Stem of halteres whitish, the knob blackish brown. Femora yellowish or yellowish brown; tibiae, except apices, and base of tarsi yellowish, the remainder of the tarsi blackish brown. Wings whitish hyaline, the veins partly yellow and partly brown. (Fig. 66.)

Type locality.—Eastern Florida.

Type.—Not in existence.

Distribution.—The 2 males and 10 females examined were from the following localities: Florida—Pensacola, October 11; Marco, April

21; De Funiak Springs, October 17 [Amer. Mus.]; Gotha, March [Cornell]; Turkey Creek, March 3; Anna Maria Key, March 30; Seven Oaks, May 1 (M. C. Van Duzee), [all M. C. Van Duzee].

PSILOCEPHALA SENILIS (Fabricius).

1805. *Bibo senilis* FABRICIUS, Syst. Antliat., p. 68.
1821. *Thereva senilis* WIEDEMANN, Exot. Dipt., vol. 4, p. 112.

Kröber redescribes the species from two poorly preserved specimens in his paper on the North American Therevidae, but his description is quite complete. The male was from Brazil, the female from Savannah, Georgia; these specimens were not acquired by the National Museum. It would be difficult to place the species with relation to others without seeing specimens.

PSILOCEPHALA POLLINOSA, new species.

Plate 8, fig. 92.

Male.—Black, white pollinose. Frons black, silvery white pollinose, with a central depression, deeper above the antennae. Antennae short, black, the first and second joints with short black bristles; third joint almost as long as the first and second combined and a little wider; the arista short. (Fig. 92.) Face silvery white pollinose; palpi black, white pollinose. Occiput whitish pollinose and pilose, the post-ocular bristles black; short pile on ocellar tubercle black.

Thorax black, the mesonotum and pleura rather long, erect white pilose and gray pollinose; scutellum the same color, almost shining black in the middle, with four black marginal bristles and long white pile. Knob of halteres largely yellowish, whitish pollinose, the basal part and stem blackish.

Abdomen black, gray or silvery gray pollinose, long silvery white pilose, reclinate on the dorsum, more erect on the sides and venter; sixth and seventh segments very short, the fifth, sixth, and seventh combined about equal to the third. Genitalia black on the exterior, short yellowish pilose on the upper part, long on the hypandrium and with a few black hairs in the center; the exterior genitalia gray pollinose. Femora, tips of tibiae, and tarsi except base black; base of tarsi and tibiae yellowish; femora with short white pile; bristles of legs black. Wings hyaline, R–1 yellow, the rest of the veins and the stigma brown; cell M–3 wide open.

Holotype.—A male collected at Tuolumne Meadows, California, August 1, 1915 (C. L. Fox), [Cal. Acad. of Sciences].

In general appearance this species resembles *limata*. It stands near the genus *Dialineura* in some respects, but the antennae are of different structure.

PSILOCEPHALA LATIFRONS, new species.

Plate 6, fig. 61.

Male.—Black, gray pollinose species. Frons bare, silvery gray pollinose, rather large, *the eyes separated at the vertex by the width of the ocellar tubercle;* ocellar tubercle with black pile. Antennae short, first joint as long as the third. rather heavy, it and the second joint gray pollinose; first and second joints with quite long pile and a few short black bristles on the outside and below. Cheeks with a dark spot on which there are some black hairs. Occiput gray pollinose and white pilose, the post-ocular bristles black.

Dorsum of thorax blackish gray, with two widely separated vittae and the lateral margins whitish gray; pile of thorax erect, white. Pleura black, gray pollinose and white pilose. Scutellum gray pollinose, white pilose, with four marginal bristles. Halteres blackish, the knob thinly gray pollinose.

Abdomen black, densely gray pollinose, silvery on the dorsum, the thick reclinate pile silvery white. All the abdominal pile white. Genitalia small, black, the upper portion larger than the hypandrium and gray pollinose; a few black hairs on the hypandrium. Abdomen quite long; with seven distinct segments before the genitalia. Femora, and tarsi except bases, tibiae except tips, black; bases of tarsi and basal portion of tibiae reddish brown; pile of femora white. Wings hyaline, the veins brown, stigma dark brown; cell M–3 wide open.

Type locality.—Holotype, a male, collected at West Danby, New York, May 30, 1915.

Type.—In the Cornell University collection.

Distribution.—The distribution according to the six males examined is:

Canada: County Prince Edward, Ontario, May 24 (Evans), [Canad. coll.].

New York: The type specimen.

New Jersey: Camden, May 4 (M. C. Van Duzee), [Van Duzee]; Toms River, May 30 [C. W. Johnson].

Pennsylvania: Allegheny County [Carnegie Mus.]; Conewago, April 16 [Harrisb. coll.].

All specimens (five) other than the type are paratypes.

Maj. E. E. Austen, of the British Museum, has kindly examined the types of Walker's six species of North American Therevidae and finds that three of them belong to the genus *Psilocephala.* Although it is not possible to tell with certainty what the species are until all the described species are better known, I have thought it best to include Walker's descriptions, as the species will some day be worked out.

PSILOCEPHALA GERMANA (Walker)

1848. *Thereva germana* WALKER, List Dipt. Brit. Mus., vol. 1, p. 222.

The original description reads as follows:

Fusca, capite cinereo subtus albo, thoracis vittis duabus lateribus pectoreque cinereis, abdomine nigro-argenteo micante, antennis nigris, pedibus fulvis, alis subcinereis.

Head gray behind, white in front and beneath, where it is thickly clothed with white hairs; eyes red; feelers and mouth black, the former clothed with black bristles, the latter with white hairs; chest dark brown, and two slender gray stripes; its sides and the breast also gray, and the latter thickly clothed with white hairs; abdomen black, covered with silvery glance; hind border of each segment clothed with yellowish white hairs; hips gray, clothed with white hairs; thighs and shanks tawny, armed with black bristles; feet darker, clothed with black hairs, tips of the joints black; wings slightly gray; brands brown; veins piceous, slightly bordered with brown in the disk of the wing; a black dot just above the cross veins near the tip of the wing; poisers ferruginous, with piceous knobs. Length of the body 3 lines; of the wings 6 lines.

Var.—Tips of the thighs and of the shanks darker; wing veins not bordered with brown.

Florida: Presented by E. Doubleday, Esq.

The type is reported to be in good condition.

Type.—In the British Museum.

PSILOCEPHALA VICINA (Walker).

1848. *Thereva vicina* WALKER, List Dipt. Brit. Mus., vol. 1, p. 222.

The original description is as follows:

Mas. Fusca aut nigra, capite nigro, abdomine cinereo fasciis fulvis apice nigro, antennis nigris, pedibus cinereis, tibiis fulvis, tibiis anticis tarsisque piceis, tarsis posterioribus basi nonnunquam fulvis alis limpidis.

Head black, with a few black bristles above, thickly clothed with white hairs behind and beneath; eyes red; feelers and mouth black, thinly clothed with short black hairs; chest and breast brown, the former clothed with gray hairs and black bristles, the latter with white hairs; abdomen dark gray, clothed with hoary hairs; hind border of each segment tawny; last segment black, shining; hips and thighs gray, clothed with white hairs; shanks tawny, darker at the tips; feet and fore shanks piceous; wings colourless; brands brown and narrow; veins piceous; poisers piceous, with ferruginous knobs. Length of the body 3½–4 lines; of the wings 6½–7 lines.

Var.—Chest and breast black; hind borders of only the second and third abdominal segments tawny; four hinder feet tawny at the base.

Nova Scotia: From Lieutenant Redman's collection.

The type is reported to be in good condition

Type.—In the British Museum.

PSILOCEPHALA CONSPICUA (Walker).

1848. *Thereva conspicua* WALKER, List Dipt. Brit. Mus., vol. 1, p. 223.

The type is a female, not a male as stated by Walker.

Fusca, capite fulvo subtus cano, thorace fulvo bivittato, pectore cinereo, abdomine nigro albo trimaculato, pedibus cinereis, tibiis fulvis, tarsis piceis, alis subcinereis.

Head tawny above, white in front, hoary behind and beneath, where it is clothed with white hairs; there are a few black bristles behind the eyes, which are red; feelers gray; the first joint clothed with black hairs; chest dark brown, with two tawny stripes; the sides hoary; breast gray; abdomen black, shining, thinly clothed with short black hairs; there is a large triangular white spot on the hind border of each of the segments from the first to the third; the first is narrower than the other two spots, and the second is larger than the third, and they are all clothed with white hairs; legs gray; shanks tawny, feet piceous; wings slightly gray; brands brown; veins piceous, very slightly bordered with brown; poisers dark ferruginous, their knobs piceous from the base to the middle, pale yellow thence to the tips. Length of the body 4 lines; of the wings 8 lines.

a. Nova Scotia: From Lieutenant Redman's collection.

Type.—In the British Museum.

Austin reports the type to be in fairly good condition and adds the following notes to the description:

The abdominal spots are paired, and occupy the anterior and posterior angles of the second (visible) tergite and the posterior angles of the third; in the case of the first pair, each spot is more or less concealed by a long fringe of backwardly directed, silvery white hair on the hind margin of the preceding segment. Although Walker does not mention it, the fifth abdominal tergite bears a deep, whitish gray pollinose, transverse band, almost or narrowly interrupted in the middle line by a forwardly and a backwardly directed triangular indentation, formed by the shining black ground color.

The writer obtained a copy of Kröber's paper, Beitrage zur Kenntnis der Thereviden und Omphraliden, published in 1914, after the type had been set up for this paper. There was no opportunity to place the species in this paper in relation to other species studied by the writer. The writer has not seen specimens of any of the eight new species of *Psilocephala* described from North America in this last paper by Kröber. Translations of the original descriptions are given below.

PSILOCEPHALA PALLIDA Kröber.

1914. *Psilocephala pallida* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 45.

The species is said to be very near *marcida*.

Male.—Length 7.5 mm. The head is silky brown, with indefinite blackish brown spots on the frons. The antennae are pale yellow, the third joint whitish, the style black. The occiput is dark brown above, pale gray below; the pile is white.

The mesonotum is grayish brown with a greenish tinge, thin white pilose. The halteres are pale yellow. The abdomen is pale yellowish brown in ground color, with thick whitish pile above; the anal segments are yellowish brown. The wings are somewhat yellowish, the stigma small, blackish brown; all the cross veins are thick, black, also the endings of the longitudinal veins; all of the posterior cells have blackish centers.

Type locality.—One male, taken in Texas, June 19.

Type.—In the United States National Museum, Cat. No. 26018.

PSILOCEPHALA MACULIPENNIS Kröber.

1914. *Psilocephala maculipennis* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 45.

Male.—Length 9 mm. Very near *tergissa.* The head is yellowish gray tomentose, the antennae pale yellow with the tip of the third joint and the style black. The mesonotum is blackish green with indefinite pale stripes.

All the legs are pale yellowish brown. The abdomen has not the brown tomentum of *tergissa;* the anal segment is reddish yellow, club-shaped. The wings are hyaline, with strong veins, the cross veins all broadly bordered with brown. The longitudinal veins have spots only at the tips; the stigma is pale.

Type locality.—Two males were taken in San Jose del Cabo, Mexico (probably the place by that name at the tip of the peninsula of Lower California).

Type.—In the United States National Museum, Cat. No. 26019.

PSILOCEPHALA BRUNNEA Kröber.

1914. *Psilocephala brunnea* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 46.

Female.—Length 10 mm. A large, predominately reddish yellow species, with reddish yellow bristles on mesonotum and scutellum. The frons is light reddish yellow tomentose, the antennae short and pale reddish yellow, the third joint onion-shaped, with a short blunt style. The occiput is blackish, thin whitish pilose. The legs are pale yellowish brown. The halteres are yellowish brown, also the abdomen, which has darker parts but no pale bands. The wings are tinged pale brown, the stigma is pale yellow.

Type locality.—Oracle, Arizona. The specimen taken June 29.

Type.—In the United States National Museum, Cat. No. 26020.

PSILOCEPHALA PILOSA Kröber.

1914. *Psilocephala pilosa* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 47.

Male.—Length 8mm. Very near *pavida.* A small, slender, largely black haired species; differing from *pilosula* Bigot, from South America, in the black tibiae. The head is yellowish white, shining, the frontal triangle black, with a yellow median line. The antennae are short, black, the third joint slender, the first and second very long and strongly black bristled.

The mesonotum is dull, black, whitish tomentose, with two fine white lines; the pile is long and black, but thin. Halteres and legs are wholly black. The abdomen is blackish and thick pilose, with

yellowish white pile at the base and white beyond, the anal segment long white haired. The wings are hyaline with a large black stigma.

Type locality.—Hot Springs, Arizona, June 20.

Type.—In the United States National Museum, Cat. No. 26021.

PSILOCEPHALA PLATYPTERA Kröber.

1914. *Psilocephala platyptera* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 47.

Male.—Length 8 mm. The most beautiful and extraordinary Therevid of Central America; perhaps the representative of a new genus.

The head is almost round and is silver white pilose, the antennae and mouth parts light reddish yellow, the bristles delicate, black. The mesonotum, scutellum, pleura, and coxae are pure silver white. The abdomen is silvery, the second segment with deep black lateral triangles, the third with a deep black cross band. The venter is black. The legs and halteres are blackish brown. The wings are hyaline, longer than the abdomen and broad; the whole wing tip is dark satin brown with a small cross band in the fourth posterior cell and one beginning on the stigma and running to the anal cell.

Type locality.—Rockstone Essequebo, Guatemala.

Type.—In the United States National Museum, Cat. No. 26022.

PSILOCEPHALA NIGRINA Kröber.

1914. *Psilocephala nigrina* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 53.

Female.—Length 7 mm. Very near *P. munda*, but the frontal callosity is rounded out and smooth and a black stripe runs from it to the antennae. The antennae are black, very robust, especially the third joint, which appears pear-shaped, with a short, thick style.

The halteres are deep black. The legs are black, the tibiae and metatarsi dusty brown. The abdomen is shining black, the second and third segemnts with small silver side spots on the posterior margins, the fifth segment with a wide band. The wings are brownish, almost blackish tinged.

Type locality.—Florissant, Colorado, June 14.

Type.—In the United States National Museum, Cat. No. 26023.

PSILOCEPHALA LACTEIPENNIS Kröber.

1914. *Psilocephala lacteipennis* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 53.

Male.—Length 6 mm. A very beautiful, characteristic species. The head is silvery white, shining, only the frontal triangle velvet black. The antennae are slender, black. The pile is rather delicate, snow white. The mesonotum is dull, pale gray, with a broad, deep black stripe from the wing base to the shoulder. There is a delicate

brown median mesonotal vitta viewed from behind. The pleura are whitish gray. The halteres are blackish brown. The femora are black, with dense white pile and tomentum; the tibiae and metatarsi are pale yellowish brown. The abdomen is blue gray on the sides, almost without shine. The anal segment is pale reddish yellow. The wings are intense milk white, the veins whitish, only the first and second veins yellowish brown.

Type locality.—Florida.

Type.—In the United States National Museum, Cat. No. 26024.

PSILOCEPHALA RUGIFRONS Kröber.

1914. *Psilocephala rugifrons* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 54.

Female.—Very near *munda* and *haemorrhoidalis.* The frontal callus begins directly over the antennae and is at first smooth rounded, then flat and cross wrinkled. The face is black, with dusty pollen, not white. The antennae are black, slender, gray tomentose, with sparse white pile. The mesonotum is black, dull, seen from the front with warm brown reflections and two pale whitish lines. There is a shining black stripe from the wing base to the shoulder. The pleura are shining black, in part silvery tomentose. The halteres are blackish brown.

The femora are shining black, the fore femora thick, silvery white pilose; the tibiae are yellowish brown, with black tips. The scutellum is shining black, the outer tip whitish yellow. The abdomen is black, shining, almost bare, the second segment broad white on posterior margin, the fifth segment silvery. The anal segment is reddish yellow haired and bristled. The wings are hyaline, the stigma large and blackish brown.

Type locality.—Sierra Madre, Chihuahua, Mexico, 7,300 feet, March 6.

Type.—In the United States National Museum, Cat. No. 26025.

Genus DIALINEURA Rondani.

1856. *Dialineura* RONDANI, Dipt. Ital. Prodr., vol. 1. p. 155.
1865. *Pachyrrhiza* PHILIPPI, Verh. Zool.-bot. Ges. Wien, vol. 15, p. 703.

In this genus are placed the species having a bare face, open cell M–3, and an unusually dilated first antennal joint, which is pollinose, hairy, and with strong bristles. The species resemble *Thereva* closely and also a few species of *Psilocephala.* The frons of the female is without the shining callosities found in most species of *Thereva*, and the surface is uneven as in *Metaphragma*, not evenly convex. The abdomen is more conical in form than in most species of *Psilocephala.* The males are holoptic and have the genitalia pollinose on the ex-

terior. The genus was founded on *D. anilis*, the only European representative. In the opinion of the writer *Tabuda* is best kept as a separate genus.

DIALINEURA MELANOPHLEBA (Loew).

Plate 9, figs. 108, 111, and 112.

1876. *Thereva melanophleba* LOEW, Zeitschr. Ges. Natur., new ser., vol. 14, p. 317.

This small species should be quite easily recognized from Loew's description and the figures given on plate 9. In spite of the partially hairy face this species seems to fit well in the genus *Dialineura*. The female frons suggests *Tabuda* and *Metaphragma* more than *Thereva*. The types were collected in San Francisco, California, by Edwards, and are presumably in the Loew and Osten Sacken collection in Cambridge. In a female from Nevada the crossband on the frons shows blackish in certain lights beneath the blackish pile.

Type locality.—San Francisco, California (Edwards).

Type.—In the Museum of Comparative Zoology at Cambridge.

Distribution.—The two males and one female examined were from the following localities:

Nevada: No other data, in Loew collection [M. C. Z.].

California: San Francisco, May 25 (E. C. Van Dyke) and February 22 (F. X. Williams), [Cal. Acad. Sci.].

DIALINEURA CRASSICORNIS (Williston).

Plate 9, figs. 109 and 110.

1886. *Thereva crassicornis* WILLISTON, Trans. Amer. Ent. Soc., vol. 13, p. 293.
1893. *Psilocephala crassicornis* WILLISTON, Coquillett in Can. Ent., vol. 25, 222.

Male.—Length 11 to 12 mm. Head black; eyes separated by only a pollinose line; ocellar tubercle gray pollinose; frontal triangle dark gray with silvery reflections, lighter on the sides. Face and cheeks silvery white pollinose, also the lower occiput; upper occiput more gray; occiput and cheeks with dense white pile, which reaches up a short distance on the face. Palpi and proboscis black, white pilose, with a few black hairs. First antennal joint gray pollinose, about twice as long as the second and third combined, with long erect black bristles and white pile, a few of the hairs black (fig. 109); the second and third joints also gray pollinose, the second short black pilose; the style black, with a short apical bristle. Bristles of occiput slender and black.

Thorax and scutellum black, gray pollinose, darker on the mesonotum, with two light-gray vittae; mesonotum with erect black pile and more or less reclinate white pile, the bristles black; pile of scutellum long and white; four black marginal bristles. Pleura and coxae black, dense silvery gray pollinose and long white pilose, a

few black hairs in front of the wing base. Halteres blackish, the knob silvery gray pollinose.

Abdomen black, entirely covered with silvery white or gray pollen, the pile white, that on the dorsum reclinate and with a silvery caste. Genitalia blackish, largely thin gray pollinose, the ends of upper forceps reddish and with a tuft of black bristles (fig. 110), the bristlelike hairs of hypandrium almost all black, most of the pile of upper forceps shorter and whitish. Femora black, white pilose, tibiae brownish yellow with darker tips; base of tarsi brownish yellow, the rest black. Wings gray hyaline, stigma blackish; veins black, the cross veins and fork of Rs clouded brown; cell M–3 wide open.

Female.—Length 11 to 12 mm. Like the male, but without the silvery white pollen and with shorter white pile. Frons much wider below than above, the upper half gray pollinose with short whitish and black pile, the lower half silvery gray pollinose, between the colors on each side a velvety black triangular mark, broad on the eye margin, the narrow part not reaching the center of the frons. Outside the base of antennae a dark-gray spot.

The two thoracic vittae are yellowish gray, a faint suggestion of a median stripe. Mesonotum with reclinate whitish pile, the erect black pile shorter than in male. First abdominal segment gray pollinose, the second and third largely semishining blackish, the lateral margins and posterior margins to near the middle gray pollinose; base of fourth segment and middle of segments four to seven gray black, the sides gray pollinose. Pile of the first three segments reclinate yellowish white and erect white, longer on the first; segments four to seven short erect black pilose. Genitalia largely shining black, with short, dense, erect black pile. Venter entirely gray pollinose, posterior margins of second and third segments yellowish white. Wings as in the male.

Type locality.—California.

Type.—In Kansas University collection.

Distribution.—The distribution according to 26 males and 14 females is:

Washington: Forks, Clallam County, July 2 (E. P. Van Duzee), [Cal. Acad. Sci.]; Skykomish River, May 3, 1892 [Cornell].

Oregon: Hood River, May 10 to June 6 (Cole), [Cole].

California: Lagunitas Creek, April 15 (Osten Sacken), and Marin County. (H. Edwards), [M. C. Z.]; Stanford University, April 27 to May 10 (Cole), [Cole].

Genus TABUDA Walker.

1852. *Tabuda* WALKER, Ins. Saund., Dipt., vol. 1, p. 197.

Walker's characterization of his genus is as follows:

Allied to *Apatomzya*, but there are five posterior areolets; the first is long; the second and third short and of equal length; the fourth is about twice the length of the

third; the fifth is much broader and a little longer than the fourth; the first inferior areolet is closed.

This description is of course inadequate, but the specific description is recognizable.

Verrall considered *Tabuda* as a possible synonym of *Xestomyza*, and it is undoubtedly closely related to that genus and to *Metaphragma*. The known species differ in general coloration and general habitus from *Dialineura*, and the eyes of the male are broadly separated, not holoptic as in that genus; the frons of the female is like that of *Metaphragma*, not evenly convex as in *Thereva* and more horizontal. The anal lamellae of the male genitalia are very large.

TABUDA FULVIPES Walker.

Plate 9, figs. 113, 115, and 117.

1852. *Tabuda fulvipes* WALKER, Ins. Saund., Dipt., vol. 1, p. 197.

Male.—Length 8 to 9 mm. Head more horizontal than vertical, the eyes separated almost the width of the ocellar tubercle. Frons and ocellar tubercle gray pollinose, lower half of frons with long black pile; face gray pollinose, a brown mark from the base of antenna to eye, the black pile on sides of face reaching almost up to this mark. Cheeks white pollinose and pilose; occiput white pilose, the lower part white pollinose, the upper gray; post-ocular bristles numerous, black, long near the eye margin. Antennae brown, the first two joints gray pollinose; first antennal joint more than twice the length of the second and third combined and greatly swollen (fig. 113), pile black, bristles on apical half black; second joint very small, with short black pile. Palpi yellowish, with long white pile.

Thorax black, mesonotum and scutellum grayish brown pollinose; pleura and coxae gray pollinose and white pilose; mesonotum with reclinate white pile and erect black pile; scutellum with white pile and four marginal black bristles. Stem of halteres yellowish, the knob yellowish brown, base of the knob blackish brown.

Abdomen black, gray pollinose, the dorsum silvery, the venter somewhat silvery beyond the first segment. All the abdominal pile white. Abdomen with seven visible segments, the fifth, sixth, and seventh about equal in length to the fourth. Genitalia, including the large anal lamellae, brownish yellow, most of the pile white, but with a few black hairs; short black hairs on the anal lamellae. Structure of the genitalia quite characteristic. (Fig. 115.) Venter with a white posterior margin on the second segment. Femora brownish yellow, the tips blackish, the pile white; tibiae and the first two tarsal joints yellowish, the apices and the other tarsal segments black. Wings whitish hyaline, the veins and stigma brown; costal region

faintly infuscated, the veins in the median portion of the wing with a narrow border of brown, more noticeable on the cross veins; cell M–3 wide open.

Female.—Length 9 mm. Like the male. Frons very broad, with a shallow central depression, covered with dense gray pollen; a small brown spot on eye margin above antenna; pile sparse, black. The mesonotum and abdomen brownish pollinose; the three gray vittae on mesonotum equidistant; erect black and reclinate white pile. The first three abdominal segments yellowish pilose, the remaining segments short, erect black pilose as usual in many species of *Thereva* and *Psilocephala*.

Type locality.—Walker gave no locality. Osten Sacken reported the species from Georgia.

Type.—In the British Museum.

Distribution.—The distribution according to 14 males and 2 females examined is:

Massachusetts: Ellis, May 11 (C. W. Johnson), [Cole]; Boston, May (A. L. Melander), [Cole]; Framingham, May 14 (M. C. Van Duzee), [Van Duzee].

New Jersey: Riverton, April 20 (C. W. Johnson), [Cole]; Riverton, April 27 [Kans. U.]; Manumuskin, April 24 to May 5 (Daecke), [Harrisb. coll.].

North Carolina: Southern Pines, March 25 (A. H. Manee), [Dr. Dietz].

TABUDA BOREALIS, new species.

Plate 9, figs. 114 and 116.

Male.—Length 9 mm. The specimen described is considerably greased and the color of the pollen on the body can be seen only in small patches. The body is brownish black. Eyes separated by a space as wide as the ocellar tubercle; frons yellowish brown pollinose, with sparse yellowish pile above the antennae and on the vertex. Face colored and pollinose like the frons, the lower face, cheeks, and occiput with brownish yellow pile; post-ocular bristles black. First antennal joint brown, considerably longer than the blackish third (fig. 114), with long yellowish and black pile, the bristles on apical half black. Mouth parts brown, with long yellowish brown pile.

Thorax blackish brown, evidently yellowish gray pollinose and golden brown pilose, the pile quite dense; thoracic bristles and a few hairs black. Scutellum blackish brown, the dense erect pile colored like that on the thorax, with four black marginal bristles. Halteres brownish yellow, the base of the knob black. Pleura and coxae blackish brown, yellowish brown pilose.

Abdomen dull brown, with yellowish pollen and yellowish brown pile as on the thorax; median portion of the first three segments and

all of the following segments with pile colored like that on the dorsum. Genitalia brown, differing considerably in shape from genitalia of *T. fulvipes* (fig. 116), with more or less yellowish pollen; pile brownish, short above, long and with a few black hairs intermixed on the hypandrium. Femora blackish brown, the apices of femora, tibiae except apices, and bases of tarsi yellowish; apices of tibiae and rest of tarsi black; pile of femora yellowish, that on the hind femora short and reclinate. Wings gray hyaline, the veins brown, the costa and subcosta yellow; cell M–3 wide open. In fresh specimens the cross veins are evidently clouded brown.

Female.—Length 10 mm. Very nearly like the male. Frons much broader and with two tufts of brown pile near the middle, one each side of the median line. Pile of vertex blackish, on the lower third of frons yellow. There is a shallow depression running across the middle of the frons. Pile of the mesonotum yellowish, more dense than in the male, with a few black hairs intermixed. Abdomen more or less greased but evidently almost entirely brownish yellow pollinose, the bases of the segments darker; pile of first three segments reclinate, yellowish, the other segments short erect black. Genitalia blackish, the short pile and circlet of blunt bristles yellow.

Type locality.—Gull Lake, Saskatchewan, Canada, April 30, 1908, on sand by coyote holes (T. N. Willing).

Type.—Male, in the collection of C. W. Johnson; allotype, female, in same.

The two types are the only specimens known; they were sent to Kröber for examination and were determined by him as *Tabuda fulvipes* Walker.

Genus METAPHRAGMA Coquillett.

1894. *Metaphragma* COQUILLETT, Journ. New York, Ent. Soc., vol. 2, p. 97.

Head much broader than long; eyes of male separated the width of the ocellar tubercle. First antennal joint almost as long as the head, much longer than the second and third combined and greatly thickened, with long pile but no distinct bristles; the style is apical. Head rather flattened and horizontal in shape, the frons and face greatly retreating; face thickly pilose; proboscis nearly as long as the head.

General shape of body much as in *Thereva*. Wing with an extra cross vein in cell R–5, outside of small cross vein and beyond the fork of Rs; the wing is otherwise much as in *Thereva*.

The presence of this cross vein alone does not seem to be a very good generic character and perhaps this species should be placed in *Xestomyza*.

Genotype.—*Xestomyza planiceps* Loew.

METAPHRAGMA PLANICEPS (Loew).

Plate 10, fig. 118.

1872. *Xestomyza planiceps* LOEW, Berlin. Ent. Zeitschr., vol. 16, p. 75.

Male.—Length 9 mm. Head black, eyes separated at vertex by the width of the ocellar tubercle; pile of vertex and lower frons long erect black, the middle of the frons with scarcely any pile. Frons swollen at the base of each antenna. The black pile of frons reaches almost to the lower corner of the eye. Face and cheeks whitish pollinose, the occiput dark gray; pile of upper occiput and the bristles black; pile of cheeks long, dense, white, reaching almost to the black pile of the face. Palpi black, gray pollinose and long white pilose. First antennal joint unusually long and robust (fig. 118), almost as long as head, gray pollinose, the apical half with long black bristles, pile long erect and black; second antennal joint very small, short, black pilose; third joint black, scarcely wider than the second, with a very small style.

Thorax black, the mesonotum more or less flattened, gray-black pollinose, with short reclinate white pile and more dense erect black pile. Scutellum colored like the mesonotum, with long white pile and four black marginal bristles. Pleura and coxae dense grayish white pollinose and white pilose. Stem of halteres yellowish, the knob black, thinly gray pollinose.

Abdomen black, densely silvery gray pollinose, the pile silvery white, dense, and reclinate on the dorsum. Genitalia black, gray pollinose, white pilose, the hypandrium small. (Fig. 118.) Femora black, gray pollinose, white pilose, the tips yellow; tibiae yellow with black tips, the tarsi black with bases yellow. Bristles of legs black. Wings whitish hyaline, the cross veins narrowly bordered gray, the costal margin narrowly blackish gray.

Female.—Length 12 mm. Very nearly like the male, the frons considerably broader. Pile of femora shorter, on the hind femora reclinate. Abdomen black, thinly gray pollinose, the seventh segment and genitalia shining blackish brown; first three segments reclinate yellowish white pilose, on the remaining segments, including the genitalia erect black pilose, the circlet of bristles black.

Type locality.—California (Edwards).

Type.—In the Museum of Comparative Zoology at Cambridge.

Distribution.—The distribution according to 10 males and 4 females examined is:

Canada: Okanagan Falls, British Columbia, April 29 (E. M. Anderson), [R. S. Sherman]; Penticton, British Columbia, April 30 (E. R. Buckell), [Canad. coll].

Washington: Lind, April 21 (Cole), [Cole]; Wawawai [R. C. Shannon].

California: San Francisco, March 26 to April 19 (E. C. Van Dyke), [Cal. Acad. Sci.]; "Cal." (Edwards), [Amer. Mus.]; La Quinta, San Bernardino County, April (Cole), [Cole].

Genus THEREVA Latreille.

1796. *Thereva* Latreille, Precis Caract. gener. Ins., p. 167.
1775. *Bibio* Fabricius (not Geoffroy), Syst. Ent., p. 756.
1840. *Exopata* Macquart, Dipt. Exot., vol. 2, p. 76.
Thereva Loew and many other authors.

Very nearly like *Psilocephala*, usually larger and more thickly pilose, the main distinguishing character being the hairiness of the face; the head is of much the same shape as *Psilocephala*. The frons of the male is usually thickly pilose and in both sexes the face, cheeks, and occiput are pilose, often densely so in the male; in many species the frons of the female offers good specific characters, having velvety black or shining black marks or callosities which vary greatly in shape and size. The antennae do not vary so greatly in shape as in *Psilocephala* and are always shorter than the head, the color usually being constant and of specific importance; the basal joint is rather long and cylindrical, never greatly inflated, with some pile and with bristles on the apical portion; second joint short and with short pile; the third joint divergent, about as long as the first, with the appearance of an annulation at the base, with no pile and with a short apical style, at the end of which there is a very short bristle.

The thorax is about as in *Psilocephala*, often densely pilose in the male; the thoracic bristles arranged in about the same manner as in *Psilocephala*. There are two pairs of marginal bristles on the scutellum.

The abdomen is conical and longer than the thorax, with seven or eight obvious segments in the male, the eighth segment in the female being the base of the ovipositor. The dorsum of the abdomen is never flattened and densely silvery pollinose as in many species of *Psilocephala*, with the exception of one aberrant species. The male genitalia are distinct, but do not show the unusual development found in some of the other genera and are proportionately rather small; in some species that are well differentiated in other ways the external male genitalia are apparently the same in structure.

The legs are much the same as in *Psilocephala*, but in most species with more bristles; in the males the femora often long dense pilose; the bristles of the hind femora form an irregular antero-ventral row of about seven; the bristles of the tibiae arranged about as in *Psilocephala*—three rows of three to six bristles on the front, four rows of four to seven on the middle, and four rows of about eight on the hind tibiae. There is some specific and some individual variation.

The venation is the normal one for the family. There seems to be more individual variation in this genus than in *Psilocephala;* cell M–3 may be closed or open in the same species, or closed in one wing of a specimen and open in the other. R–4 is never sharply curved. In some species the wings are generally infuscated or spotted, in the majority of species hyaline, or the cross veins clouded.

In the following tables of species Walker's three species—*varia*, *nervosa*, and *senex*—are not included because it is impossible to identify them with certainty at present. Although the female of *T. strigipes* is well marked, I have seen only one poorly preserved male, which I have described. In the table of females *anomala* Adams, *nigra* Say, and *bolbocera* Osten Sacken are omitted, the first two because of inadequate descriptions. *T. crassicornis* Bellardi and *T. ruficornis* Macquart are not included in the tables; the first species may be recognized some day from Mexican material, but the description of the latter is too brief to identify the species.

TABLE OF MALES.[10]

1. Small, *Psilocephala*-like species, the abdominal tergites rather flattened and silvery pollinose ..... 2.
   Species over 6 mm. in length; the abdomen conical in general shape and not silvery above ..... 4.
2. Wings with two brown crossbands ..... anomala Adams.
   Wings hyaline ..... 3.
3. Sides of the second to fifth abdominal segments shining black; front legs wholly black ..... pygmaea, new species.
   Sides of the abdomen gray pollinose; front tibiae except the apex and the tarsi yellow ..... melanoneura Loew.
4. Abdomen whitish pollinose and clothed with white or silvery white pile; (in the female the frons dull pollinose) ..... 5.
   Abdomen not colored thus (in the female with a shining callosity on the frons, or one or more shining marks) ..... 17.
5. Bristles of head and thorax yellowish white; femora yellowish; southwestern species ..... semitaria Coquillett.
   Bristles of head usually black, those of the thorax black ..... 6.
6. Femora yellowish ..... bella Kröber.
   Femora black ..... 7.
7. Pile of head and thorax entirely black ..... pacifica, new species.
   Pile of head and thorax largely white or yellowish ..... 8.
8. Wings hyaline or whitish, without clouded veins or dark markings ..... 9.
   Wings with veins bordered or spotted ..... 14.
9. Tips of the femora yellow; eastern species ..... candidata Loew.
   Femora black to the tips ..... 10.
10. Bristles of vertex and occiput yellowish white; western species. novella Coquillett.
    Bristles of vertex and occiput black ..... 11.
11. Frons with a hemispherical black callosity; antennae with black pile. californica Kröber.
    Frons without callosity, gray pollinose; antennae white pilose ..... 12.

[10] Four species described by Kröber in his 1914 paper are not included, the writer knowing of only one species when submitting this manuscript.

12. All the wing veins black; first antennal joint slightly shorter than the third; eastern species ..... **albifrons** Say.
Costa to near tip of wing and base of Rs yellowish; western species ..... 13.
13. Knob of halteres blackish; upper forceps of genitalia long and curved. **cockerelli**, new species.
Knob of halteres white; upper forceps of genitalia not slender and curved. **vialis** Osten Sacken.
14. Knob of halteres white ..... **otiosa** Coquillett.
Knob of halteres blackish brown ..... 15.
15. Pile of frons and sides of face long and black ..... **albopilosa** Kröber.
Pile of frons yellow or white ..... 16.
16. Pile of frons yellow; small hairs of tibiae black ..... **vanduzeei**, new species.
Pile of frons white; small hairs of tibiae white ..... **niveipennis** Kröber.
17. Femora yellowish, at least on the apical third ..... 18.
Femora black to the tips ..... 24.
18. Thorax with three broad shining black stripes ..... 19.
Thorax without shining black vittae ..... 20.
19. Abdomen largely shining black; antennae black ..... **hirticeps** Loew.
Abdomen largely yellow; antennae yellowish ..... **fucata** Loew.
20. Wings thickly marked with dark brown ..... **bakeri**, new species.
Wings hyaline or with narrow borders to some veins ..... 21.
21. Frons without black pile; femora yellow to base ..... **duplicis** Coquillett.
Frons with more or less black pile ..... 22.
22. Knob of halteres yellow, western species ..... **pseudoculata**, new species.
Knob of halteres blackish or brown ..... 23.
23. Pile of abdomen white and not very long; femora yellow to base; eastern species. **flavicincta** Loew.
Pile of abdomen yellow, unusually long and dense; femora black to beyond middle; western species ..... **flavipilosa**, new species.
24. Abdomen entirely pollinose ..... 25.
Abdomen in part shining black ..... 26.
25. Abdomen brownish black pollinose; third antennal joint as long as first. **egressa** Coquillett.
Abdomen yellowish pollinose; third antennal joint three-fourths as long as first. **johnsoni** Coquillett.
26. Wings more or less clouded and marked with dark brown; veins broadly bordered with brown ..... 27.
Wings largely hyaline, the veins sometimes narrowly bordered with brown... 29.
27. Dorsum of thorax unstriped ..... **aurofasciata** Kröber.
Dorsum of thorax vittate ..... 28.
28. Abdomen with pollinose bands ..... **comata** Loew.
Abdomen without pollinose bands ..... **nebulosa** Kröber.
29. The halves of the hypandrium of the genitalia each with a rather long apical process which reaches beyond the upper forceps and is directed inward. **cingulata** Kröber.
The plates of the hypandrium with short processes ..... 30.
30. Pile of body almost entirely black; all pile of mesonotum and dorsum of abdomen black ..... 31.
Pile of body largely white or yellowish ..... 32.
31. Thorax distinctly vittate; hypandrium with very short knoblike processes. **foxi**, new species.
Thorax very faintly brown vittate; hypandrium with quite long processes. **nigripilosa**, new species.

32. Abdominal segments two to six shining black except for the narrow yellow borders, the abdominal pile black ..... **brunnea**, new species.
Abdominal segments with broad pollinose areas; the venter largely pollinose; pile of abdomen largely white or yellow ..... 33.
33. Venter mostly yellow and the tergites of abdomen marked with yellow; thorax with a median pure black vitta and two gray vittae..... **diversa** Coquillett.
Abdomen black in ground color; thorax not marked as above..... 34.
34. Mesonotum dull dark brown, with two yellowish vittae; wings with no clouds on the veins..... **ustulata** Kröber.
Mesonotum gray pollinose, with two whitish vittae; wings with the cross veins clouded ..... **frontalis** Say.

TABLE OF FEMALES.

1. Frons entirely pollinose, often with velvet black spots..... 2.
Frons with a shining black callosity or with one or two shining black marks. 14.
2. Frons without any black markings..... 3.
Frons with velvet black markings ..... 7.
3. Small, *Psilocephala*-like species; pile of the face short; frons with dense tomentumlike pile; antennae yellow with a black style; femora yellow.
semitaria Coquillett.
Larger, more heavily built species; frons without tomentumlike pile; antennae black ..... 4.
4. Abdomen largely shining black; mesonotum grayish black; black pile of fron. short and sparse..... **borealis**, new species.
Abdomen largely gray pollinose; mesonotum gray pollinose..... 5.
5. Frons entirely whitish pollinose and white pilose..... **albiceps** Loew.
Frons yellowish on upper part and black pilose..... 6.
6. Knob of halteres largely white; reclinate pile of mesonotum yellowish.
cinerascens, new species.
Knob of halteres blackish; reclinate pile of mesonotum white.
cockerelli, new species.
7. No distinct frontal spots present, in certain lights a dark mark next the eye margin; femora yellow ..... **bella** Kröber
Frontal spots larger and distinct; femora black..... 8.
8. Frontal markings consist of two round, velvet black spots..... 9
Frontal markings in the form of a crossband, interrupted or entire..... 11.
Frontal markings consist of two triangular, velvet black spots, one on each side.
nitoris Coquillett.
9. Wing veins marked or bordered with brown; western species.
otiosa Coquillett.
Wing veins not bordered with brown..... 10.
10. First antennal joint about as wide as the third; western species.
vialis Osten Sacken.
First antennal joint much thicker than the third; eastern species.
bimaculata, new species.
11. Bristles of vertex and occiput yellowish; thorax without black pile.
novella Coquillett.
Bristles of occiput and vertex black..... 12.
12. Wing veins pale yellow; eastern species..... **candidata** Loew.
Wing veins black or brown; western species..... 13.
13. Wings whitish hyaline, with no clouds on veins; pile of face and thorax white.
pacifica, new species.
Wings with clouded cross veins; pile of face and thorax yellow.
vanduzeei, new species.

14. Frons shining black except for silvery lower corners; small *Psilocephala*-like species..... **pygmaea**, new species.
Frons with the pollen more extended; larger and more typical species..... 15.
15. Frons with one shining black spot, usually cordate and convex..... 16.
Frons with two shining black marks..... 24.
16. Femora black..... 17.
Femora yellow or brownish yellow..... 20.
17. Upper two-thirds of frons entirely shining black..... **strigipes** Loew.
Black of the frons reduced to a smaller area by the pollen..... 18.
18. The brown areas of mesonotum appearing as three broad, dark-brown vittae; frons dark-yellow pollinose..... **brunnea**, new species.
The mesonotum more gray in color; pollen of the face yellowish gray..... 19.
19. Thorax with the markings pale; scutellum gray pollinose; western species, pile of face white..... **cingulata** Kröber.
Thorax with markings pale; scutellum with brown spot; pile of face yellowish. **neomexicana**, new species.
Thorax with three distinct dark vittae; scutellum with a brownish spot at the base; eastern species, face white pilose..... **frontalis** Say.
20. Thorax with three broad shining black vittae..... 21.
Thorax without shining black vittae..... 22.
21. Abdomen largely yellow; first antennal joint yellow..... **fucata** Loew.
Abdomen largely shining black; first antennal joint black..... **hirticeps** Loew.
22. Wings marked with dark brown; dorsum of abdomen largely yellow; thoracic vittae dark..... **bakeri**, new species.
Wings almost hyaline, dorsum of abdomen largely black..... 23.
23. Frontal callosity separated from the lower ocellus by pollen; thorax with a median black stripe..... **diversa** Coquillett.
Frontal callosity reaching the lower ocellus; thorax without median black stripe; eastern species..... **flavicincta** Loew.
24. The shining black spots of frons projecting in two hemispherical, eyelike knobs. **pseudoculata**, new species.
The frontal callosities not projecting thus..... 25.
25. Femora yellow or largely yellow..... 26.
Femora black..... 27.
26. Femora wholly yellow; first antennal joint black..... **duplicis** Coquillett.
Front femora black except apex, the hind femora black basally; first antennal joint yellow..... **flavicauda** Coquillett.
27. The shining transverse frontal spots wider than the antennae and almost touching in the middle; cross veins narrowly bordered brown..... 28.
Frontal spots very narrow; wings densely mottled with brown..... 29.
28. Third antennal joint three-fourths as long as the first; abdomen yellowish brown pollinose; last two segments shining brown..... **johnsoni** Coquillett.
Third antennal joint about as long as first; abdomen blackish brown pollinose; last two segments shining blackish..... **egressa** Coquillett.
29. Abdomen with pollinose bands..... **comata** Loew.
Abdomen without pollinose bands..... **nebulosa** Kröber

THEREVA PYGMAEA, new species.

Plate 10, fig. 127; plate 11, figs. 143, 144; and plate 12, fig. 165.

Male.—Length 5.5 mm. A small *Psilocephala*-like species, largely shining black. Head black, the eyes contiguous for only a short distance; upper corner of the frontal triangle without pollen, the

rest of the frons silvery white and with long black pile. Face silvery white pollinose and largely white pilose, the outer margin with black pile, this black pile reaching to the black mark on the cheeks and crossing it on the underside of the head. Mouth parts blackish with white pile. Occiput silvery gray pollinose, thinly so in the median portion above, the pile white, post-ocular bristles black and slender. Antennae black, the first joint about the length of the third (fig. 143), with white pile and black bristles; third joint with minute hairs at the base and a short style; first two joints gray pollinose.

Thorax semishining black, with two very distinct widely separated whitish vittae; pile of mesonotum largely erect, blackish, white around the margins; scutellum shining black with a silvery pollinose margin, four marginal black bristles, the pile white. Pleura and coxae gray pollinose and white pilose. Bristles of the thorax long and black. Halteres blackish, the stem paler.

Abdomen shining black; first segment dull, second segment semishining on the base, the rest of the dorsum silvery pollinose as in many species of *Psilocephala;* sides of segments beyond the third shining black. Venter shining black, the first segment gray pollinose, the second and third with silvery pollinose posterior margins. Genitalia black, small (fig. 144), the pile almost entirely black. Pile of the abdomen long and white on the first segment and sides of the others, on the dorsum reclinate and confined largely to the posterior margins. Femora black, the front legs entirely black, or reddish at the base of the tibiae; the four hind tibiae except apices reddish; four hind tarsi reddish at base, black beyond. Wings hyaline, the veins blackish brown, stigma brown, cell M–3 closed and petiolate.

Female.—Length 6 to 7 mm. Very nearly like the male. Frons wide below, narrow above, largely shining black, including the vertex and ocellar tubercle, smooth, gently convex, the lower corners silvery as in some species of *Psilocephala* (fig. 127); there are a few black hairs on the vertex and across the frons above the antennae. Pile of the head colored as in the male but shorter, black mark on the cheeks broader.

Thorax and scutellum much as in the male, the pile much shorter; the mesonotum with short golden tomentumlike pile, the reclinate pile on the scutellum silvery white. Abdomen shining black, the first segment gray pollinose on sides and venter, the second and third segments with narrow silvery posterior borders, the fifth segment with large lateral silvery pollinose spots. Pile on the first three segments very sparse, largely on the posterior margins; some black pile on the sides of the third, from the fourth segment on black erect pilose, the pile longer than is usual in the species of *Thereva* and *Psilocephala.* Posterior margins of second and third ventral

segments silvery pollinose, the rest of the venter shining black. Wings hyaline or with a grayish tinge.

Type locality.—Glen Martin, in the San Bernardino Mountains, San Bernardino County, California, August 16, 1920 (F. R. Cole).

Type.—Male, Cat. No. 25935, U.S.N.M.; allotype, female, in same.

This species in some ways forms a connecting link between *Psilocephala* and *Thereva*. By reason of the hairy face it would be classed with the genus *Thereva*, and yet it has many characters in common with the *haemorrhoidalis* group in *Psilocephala*, the frons of the female resembling some of the species in that group; like the males in that same group, the abdomen is rather flattened and silvery pollinose above. Perhaps the writer is too conservative, but for the present it seems best to hold to the old character of the bare or pilose face for distinguishing the genera *Thereva* and *Psilocephala*.

The species described above was collected along the edges of a small stream. Although very quick in their movements these flies are sometimes easily caught while they are rummaging about in the drift trash at the edge of the water. Like many other Therevids their normal flight is hoplike and for short distances only.

Paratypes.—There are 10 males and 15 females, taken by the writer at Glen Martin, the type locality, from August 7 to 20. One paratype, taken at Shasta Springs, July (C. L. Fox), in the California Academy of Sciences.

THEREVA ANOMALA Adams.

1904. *Thereva anomala* ADAMS, Kans. Univ. Sci. Bull., vol. 2, p. 444.

The species is said to resemble some species of *Psilocephala* in general appearance. It has two brown crossbands on the wing. The length is given as 9 to 10 mm.

Type locality.—Oak Creek Canyon, Arizona.

Types.—In the Kansas University collection.

THEREVA MELANONEURA Loew.

Plate 10, fig. 125; plate 11, fig. 145; and plate 12, fig. 156.

1872. *Thereva melanoneura* LOEW, Berlin. Ent. Zeitschr., vol. 16, p. 74.

Type locality.—California.

Type.—In the Museum of Comparative Zoology at Cambridge.

This is another *Psilocephala*-like species, with dense silvery white pollen on the dorsum of the abdomen in the male.

A male specimen from New Mexico loaned by C. W. Johnson but for the hairy face would be placed in *Psilocephala*. The hair of the frons and face is as long or longer than the first two antennal joints combined. The middle of the frons is very thinly pollinose,

semishining. There is no black pile on the antennae. The first abdominal segment is gray pollinose, the sides of the second semishining. The upper forceps of the genitalia are largely black. The genitalia are figured on plate 11.

A female sent with the above specimen was taken in the same locality. The female is strikingly different from the male and is described below:

Female.—Length 7.5 to 8.5 mm. Head black, frons with a few short black hairs and a line of black pile on upper side of face and outer margin, the rest of the face, cheeks, and occiput with long white pile. Occiput and face gray pollinose, the post-ocular bristles black. Two very large, round, shining black calli on lower half of frons (fig. 125); upper half of frons and vertex flat, brownish gray pollinose. Antennae black with black bristles, more or less gray pollinose, especially the first two joints, the first joint slightly longer than the third and with white pile on the basal half.

Thorax opaque grayish black, reclinate whitish pilose and with some erect brownish pile. Mesonotum with two faint gray stripes. Scutellum colored like the thorax, with reclinate white pile and four black bristles. Pleura and coxae black, gray pollinose, white pilose. Halteres blackish, including the stem.

Abdomen largely shining black, the first two segments thinly white pilose, the other segments short, erect, rather dense black pilose; second segment with a distinct white border, a very narrow one on the third segment; second and third segments more or less gray pollinose on sides and posterior margins, gray pollen above on the fifth. Venter gray pollinose, thinly so beyond the fourth segment, black pilose beyond the second. Tibiae and first tarsal joints except the apices yellowish red, the legs otherwise black, with black bristles; femora with reclinate silvery white pile and some erect white pile, more dense on the front pairs; front and middle femora with three bristles below. Wings hyaline, the veins heavy and black, the stimga brown; r–m cross vein faintly clouded, cell M–3 closed and petiolate. (Fig. 156.)

Neallotype.—Female, collected at Alamogordo, New Mexico, May 5, 1902, No. 663 [A. N. S. P].

Specimens examined.—One male, three females.

The four specimens seen by the writer were all from New Mexico. The sexes are so different that until they are actually taken together there will be some doubt as to their belonging to the same species. Coquillett records taking 10 specimens at Kukak Bay, Alaska, and Kröber records the species from southern Colorado.

THEREVA SEMITARIA Coquillett.

Plate 10, fig. 128, and plate 11, fig. 138.

1893. *Thereva semitaria* COQUILLETT, Can. Ent., vol. 25, p. 198.

The species more nearly resembles *Psilocephala acuta* and *P. marcida* than any of the species of *Thereva*, the eyes being shaped as in *acuta*. In the female the frons and face has reclinate, tomentum-like pile; the antennal style is black. The vittae of the thorax are dark gray, indistinct. The only specimen examined by the writer was a female collected at Bradley, California, May 23 (E. P. Van Duzee), in the California Academy of Sciences. This specimen has the front femora partially brownish. The veins toward the base of the wing are yellowish, blackish beyond, the stigma black.

Type locality.—Southern California.

Type.—Male, No. 10421, U.S.N.M.

THEREVA OTIOSA Coquillett.

Plate 10, fig. 124; plate 11, fig. 141; and plate 12, fig. 167.

1893. *Thereva otiosa* COQUILLETT, Can. Ent., vol. 25, p. 199.

This species is closely allied to *vialis* and *candidata*. The wings are grayish hyaline, with narrowly bordered veins. (Fig. 167.) The frontal spots of the female are quite large. (Fig. 124.)

Type locality.—Los Angeles County, California.

Types.—Male, No. 10423, U.S.N.M.

The outer covering of the male genitalia is gray pollinose, the general shape as in *vialis* Osten Sacken. In the females examined the thorax was gray pollinose, marked with brown; there is a broad median brown stripe hardly reaching the scutellum and with a faint gray longitudinal dividing line, on either side a broad brown stripe or mark, broadest above the wing base and not reaching to the humeri or scutellum. The first seven abdominal segments are gray pollinose, the very narrow base of the second, third, and fourth brown on the sides; the pile is short, sparse, and whitish.

Distribution.—The two males and two females examined were from the following localities: California—Claremont (Baker), [Pomona College]; Shasta County (Edwards), [Amer. Mus.]; Crafton, San Bernardino County (Osten Sacken), [M. C. Z.].

THEREVA NOVELLA Coquillett.

Plate 11, fig. 139.

1893. *Thereva novella* COQUILLETT, Can. Ent., vol. 25, p. 200.

The original description by Coquillett is as follows:

Male.—Same as *otiosa*, with these exceptions: Style of antennae two-fifths as long as the third joint; pile and bristles of vertex and bristles of occiput yellowish white;

thorax destitute of black pile; knob of halteres brown, margined with yellow; veins of wings largely yellow, stigma also yellow and indistinct.

Female differs from the female of *otiosa*, besides in the particulars above mentioned, in that the front is destitute of the two round velvet black spots, having instead a narrow, interrupted, dark-brown crossband; eighth abdominal segment opaque pollinose, its pile largely yellow.

Length 8 to 11 mm. Los Angeles County, California. Five males and one female.

C. W. Johnson very kindly loaned the only two specimens of this species in his collection; these were the only specimens available for examination. Both are males, one labeled "Colo. no. 1836" and the other "Ft. Collins, Colo., VIII, '00." The first specimen lacks the third joint of each antennae and is scarcely distinguishable from the male of *candidata*, the bristles of the occiput being black. The other specimen is about 11 mm. in length and has a very characteristic third antennal joint, the base bulbous and black, the apical half very slender and yellow, with a short black arista (fig. 139); the first joint is shorter than the third, white pilose, and with a few black bristles at the tip. The specimen has been wet and considerably rubbed. The knob of the halteres is not black at the base as in *candidata*, but yellowish. Vein R 1 is brown, the other veins yellow. The femora are black to the tips.

THEREVA VIALIS Osten Sacken.

Plate 10, fig. 129; plate 11, figs. 140 and 147; and plate 12, fig. 158.

1877. *Thereva vialis* Osten Sacken, Bull. U. S. Geol. Surv., vol. 3, p. 274.

This common western species was described from males only. It is very near *candidata* Loew of the Eastern States, but differs in having black pile near the antennae, the femora black to the tips, and the wing veins darker.

Type locality.—Yosemite Valley, California.

Type.—In the Museum of Comparative Zoology at Cambridge.

Allotype.—I have designated as a neallotype a specimen taken at Stanford University, April 30, 1920 (Cole). This specimen is deposited in the United States National Museum.

Female.—Length 8 to 10 mm. Upper two-thirds of frons yellowish brown pollinose, with two large rounded velvet black spots, which almost touch in the middle (fig. 129); lower frons and face silvery white pollinose; the pile of upper frons short, black, that of the lower frons, face, first antennal joint, and occiput yellowish. Antennae black, the first joint about as long as the third, the style short; first and second joints gray pollinose. Occiput white pollinose, the pile of lower occiput and cheeks white.

Thorax black, the mesonotum dark-gray pollinose, with two pale vittae, yellowish reclinate pile and a few erect black hairs. Scutellum and pleura gray pollinose, center of scutellum darker; pile of scutellum

yellow, the four marginal bristles black, the middle pair close together and crossing; pile of upper pleura yellowish, the rest of the pile, including that on the coxae, white. Stem of the halteres blackish gray, the knob yellowish.

Abdomen black, gray pollinose, with a yellowish tinge on the dorsum; pile of dorsum pale yellowish, longer on the first segment, more or less reclinate on the first three segments, on the following segments short and erect; eighth segment and genitalia shining blackish and short erect black pilose, the circlet of bristles black. Short pile of venter erect and white. Femora with tomentumlike silvery white pile and erect white pile, only a few erect hairs on the hind femora near the base. Cell M–3 closed and short petiolate or very narrowly open in the margin of the wing. (Fig. 158.)

Distribution.—The species has been recorded from Oregon, California, Washington, and North Carolina. The North Carolina record given by Kröber is undoubtedly erroneous, the form referred to being a new species described in this paper as *bimaculata*. Twenty-six males and fourteen females were examined from the following localities:

Canada: Savary Island, British Columbia, June 30 to August 14 (R. S. Sherman), [Sherman]; Buccaneer Bay, British Columbia, July 17 (R. C. Treherne); Kamloops, British Columbia, May 25 (W. B. Anderson), [Canad. coll.]; Nanaimo, British Columbia, June 28 (E. P. Van Duzee), [Cal. Acad. Sci.].

Oregon: No other data (Edwards), [Amer. Mus.]; Hood River, June 2 to 20 (Cole), [Cole].

California: Fresno County (Edwards), [Amer. Mus.]; Blue Lake, Humboldt County, June 20 (Bradley); Alta Meadows, Sequoia National Park, 9,000 feet, July 19 (Bradley), [both Cornell]; Kern County [Kans. U.]; Shasta Springs, June 13 (C. L. Fox); Bradley, Monterey County, May 23 (E. P. Van Duzee), [both Cal. Acad. Sci.]; Los Angeles, April 3 (M. C. Van Duzee); Los Cerritos, Los Angeles County, April 3 (M. C. Van Duzee); Portola, June 5 (M. C. Van Duzee), [all Van Duzee]; Palo Alto, April 30 to June 10 (Cole); Redlands, May (Cole), [both Cole]; Santa Cruz Mountains, May (W. M. Mann), [R. C. Shannon].

THEREVA CALIFORNICA Kröber.

1912. *Thereva californica* KRÖBER, Entom. Zeitung, vol. 73, p. 259.

The following is a translation of the original description:

Male.—In the group *otiosa*. Face silvery white, with white pile. Frontal triangle black, semishining. The middle has a hemispherical shining black callus. Antennae black, with black pile. Occiput through tomentum whitish gray, with snow-white pile. Thorax shining black, with whitish gray pollen and white pile. Scutel-

lum like the thorax. Pleura weak gray pollinose, sparse white pilose. Abdomen thickly white pilose without noticeable silvery shine. Second to fourth segments with white posterior borders. Anal segment spherical, prominent, black, shining. Venter through pollen whitish gray, with white pile and pure white borders on segments two to four. Femora black, through pollen and white pile appearing gray. Tibiae light yellowish brown, with darkened tips. Tarsi black, with yellowish brown base. Wings whitish, not hyaline, with strong, dark-brown veins and blackish brown stigma. The fourth posterior cell is closed. Length 8.5 mm.

Type.—In Kröber's collection.

Type locality.—California.

THEREVA CANDIDATA Loew.

Plate 10, fig. 130, and plate 11, fig. 149.

1869. *Thereva candidata* Loew, Berl. Ent. Zeitschr., vol. 13, p. 8.

Male.—Length 8.5 mm. Head black, white pollinose and with white pile on the lower frontal triangle, face, cheeks, and occiput; post-ocular bristles black. Mouth parts brown with white pile. First joint of antennae and base of second black, gray dusted, the first with black bristles near the apex and white pile; third joint yellowish, darker at the base, the arista black.

Thorax black, gray pollinose, the mesonotum dark gray, with two whitish vittae, broad anteriorly and posteriorly; the lateral margins of mesonotum light gray; pile of mesonotum erect, whitish, the bristles black. Scutellum gray pollinose, darker at the base, with long erect white pile and four black marginal bristles. Pleura and coxae silvery white pollinose and white pilose. Stem of halteres yellowish brown, base of the knob black, the rest yellow.

Abdomen black, dense gray and white pollinose, with white pile, dense and reclinate on the dorsum; base of second, third, and fourth segments with a round black spot near the middle. The hypopygium largely black, white pollinose and pilose, the outer margin of the upper forceps yellow, the hypandrium small. (Fig. 149.) Femora black, the tips broadly yellow, pile white; tibiae yellow, the extreme apices darkened; the last two tarsal joints blackish brown, the rest yellow with brown apices. Bristles of the legs black. Wings hyaline, all the veins yellow, the stigma pale yellow; cell M–3 usually wide open.

Female.—Length 10 mm. Darker than the male as a rule. Upper two-thirds of frons golden brown pollinose, the lower third silvery white; on each eye margin near the junction of the two colors a semicircular brown spot, visible only in certain lights (fig. 130); upper part of frons with short black pile, pile on the lower part and the face silvery white. Antennae black, the first joint and base of the second gray pollinose. Scutellum with short yellow pile. Mesonotum with short erect blackish pile and reclinate whitish pile.

Abdomen gray pollinose, base of second segment broadly black, semishining; third, fourth, fifth, and sixth segments with narrow black basal bands, the pile on these bands brownish, the rest of the abdominal pile short and whitish. In most specimens there is a round black spot projecting beyond the basal black band of segments two to six. Genitalia largely blackish, with short yellow pile and a yellow circlet of bristles. Wings often yellowish; cell M–3 closed or narrowly open.

Type locality.—Northern Wisconsin.

Type.—A male, in the Museum of Comparative Zoology at Cambridge.

Distribution.—The distribution according to 33 males and 19 females is:

Canada: Truro, Nova Scotia, July 4 (R. Matheson), [Cole]; St. Johns, Quebec, May 10 [Kans. U.]; Aweme, Manitoba, July 9 (Criddle), [A. N. S. P.]; Coulonge, Quebec, July 28 (J. L. Beaulne); Landraie, Quebec, June 20 (J. L. Beaulne), [both Canad. coll.]; Ridgway, Fort Erie and Kearney, Ontario, June 1 to July 20 (M. C. Van Duzee), [Van Duzee].

Maine: Norway (S. J. Smith), [M. C. Z.].

Connecticut: No other data (Loew), [M. C. Z.].

New Hampshire: White Mountains (Scudder), [M. C. Z.]; Bretton Woods, June 30 (M. C. Van Duzee), [Van Duzee].

New York: North Elba, July [Amer. Mus.]; Essex County, August (F. M. Jones), [Harrisb. coll.]; Lancaster, May 3 to June 28 (M. C. Van Duzee), [Van Duzee].

Pennsylvania: Enterlino, July 3, and Harrisburg, June 26 [Harrisb. coll.].

District of Columbia: No data (Loew), [M. C. Z.].

Virginia: Near Plummer Island, June 2 (McAtee), [Biol. Surv.].

Maryland: Plummer Island, May 30 (R. C. Shannon), [Shannon].

Ohio: Medina, May 24 (J. S. Hine), [Hine].

Michigan: "Mich." (Wheeler), [Amer. Mus.]; Agr. College, July 12 to 31 [Cornell].

Wisconsin: Cranmoor, August 5 (Hardenburg), [Harrisb. coll.].

Minnesota: Beltrami County, August 2 to 9; Chicago County, July 16; Ramsey County; Olmsted County, June 23 [all Minn. U.].

THEREVA CINERASCENS, new species.

Female.—Length 9.5 mm. A black, gray pollinose species, closely resembling the female of *candidata* Loew. Frons on upper three-fourths pale brownish pollinose, with short black pile, the lower fourth of frons and face silvery white pollinose and white pilose. Occiput white pollinose and pilose, the pile on upper part yellowish. Anten-

nae black, first two joints gray pollinose; first joint about as long as the third; black bristles of first joint rather long.

Thorax gray pollinose, dark on the mesonotum, with two whitish vittae, the margins also paler; mesonotum with short reclinate yellowish pile and erect black pile. Pleura dense whitish gray pollinose, thickly white pilose. Scutellum with a dark-gray spot at base, the margin paler, the pile reclinate yellowish; four black bristles on the margin. Knob of halteres whitish, the base black, and stem brownish.

Abdomen black, gray pollinose or yellowish gray; pile on the first five segments white or yellowish reclinate from the third to the fifth, the sixth, seventh, and the genitalia short erect black pilose. Second segment with the base broadly blackish, narrower on the third, fourth, and fifth; segments four to seven with a narrow black posterior margin, wider in the middle and connected with the base of the segment by a faint black line. Genitalia shining black. Femora black; knees, tibiae except tips, and base of tarsi yellow, the last tarsal segments and tip of first black. All bristles of the legs black. Wings gray hyaline, the costal vein, R–1, and base of wing yellowish, the rest of the veins blackish; cell M–3 closed in the margin or narrowly open.

Type locality.—Hood River, Oregon, June 13, 1917 (F. R. Cole).

Type.—Female, Cat. No. 25936, U.S.N.M.

Paratypes.—In addition to the type, two females were examined, both specimens in the collection of R. S. Sherman of Vancouver, British Columbia; the specimens were collected at Savary Island, British Columbia, July 18, 1917, by Mr. Sherman.

The male is probably very near the male of *candidata* and *vialis*. The antennae are not the same as in *candidata* and there is more black pile on the frons, darker wing veins and different abdominal markings; the femora are black to the tip.

THEREVA BIMACULATA, new species.

Female.—Length 8 mm. Very nearly like *T. vialis*. Upper two-thirds of frons pale brown, with two large velvet black spots which almost meet in the middle; the lower third of frons silvery gray and with a few short hairs. Antennae black, the first joint quite thick and with only a few apical bristles, white pilose, slightly longer than the third joint. Face silvery white pollinose with white pile; palpi and proboscis with white pile; occiput whitish, with white pile and black bristles.

Thorax and pleura black, covered with gray pollen, the pile short and white. In the somewhat poorly preserved type no markings are visible; in a perfect specimen there is probably more or less brownish pollen on the thorax. Knob of the halteres pale yellowish, the stem and base of knob brownish.

Abdomen black, brownish and gray pollinose, with short sparse white pile; last segment shining brownish black. Femora blackish brown, white pilose, the apices yellowish, as are the tibiae and tarsi; tibiae and tarsal joints with the apices brownish. Wings whitish hyaline, the stigma yellowish, the veins brown and yellowish; cell first A closed near the margin and M–3 closed in the margin.

Type locality.—Southern Pines, North Carolina, April 4, 1906 (S. W. Foster), [Cornell].

Type.—Female, in the Cornell University collection.

Paratypes.—The species should be easily recognized, and for this reason it is described from the poorly preserved type material. There are two female paratypes in the Cornell collection, taken in the type locality April 11, 1906. The facial spots are larger than in *vialis* and the antennae different, but it has undoubtedly been confused with this species by Kröber, who records *vialis* from North Carolina.

THEREVA ALBOPILOSA Kröber.

1912. *Thereva albopilosa* KRÖBER, Stett. Ent. Zeit., p. 256.

The following is a translation of the original description:

Male.—Belongs to the group *otiosa* on account of the white abdominal pile. The pile is, however, not silvery white throughout, and the ground color is clearly perceptible. The pile is very long and woolly. Face dense white pilose, so that the ground color is not visible. Frons with delicate, long, black pile, which reaches down to the lower corner of the eye. Antennae black; third joint brownish. Occiput whitish gray. Crown of bristles standing up from blackish brown, very long pile. Pile otherwise white, long, and wooly. Thorax opaque, without luster, through the mixed brown and white pile appearing peculiar gray, with two yellowish gray, indistinct, longitudinal stripes and a broad, blackish brown, median stripe. Pleura very thickly woolly white pilose. Halteres blackish brown, the stem somewhat lighter. Scutellum gray pollinose, white pilose. Abdomen in ground color black, almost opaque. Second to fifth segments with whitish yellow borders. Second to sixth with very broad yellowish gray pollinose bands. Seventh and eighth segments dull dark brown. Pile unusually long, pure white, on the reddish yellow anal lamellae yellowish. Venter yellowish gray pollinose. Second to fifth segments with yellow borders. Pile long, white. Femora blackish brown, with white pile; tibiae and tarsi yellowish brown, the tips somewhat darkened. Wings hyaline. Veins strong brown, the cross veins somewhat clouded. Stigma dark brown, large, deep colored. The fourth posterior cell closed. Length 12 mm.

Type locality.—Colorado.

Type.—Male, in Kröber's collection.

THEREVA COCKERELLI, new species.

Plate 11, fig. 146.

Male.—Length 9 mm. Head black, the frons and face dense silvery white pollinose and white pilose. Antennae black, with black bristles; the first two joints gray pollinose, the first joint with white pile on the basal half; style about one-fourth as long as the third

joint; third joint about as long as the first. Palpi black, white pollinose, and white pilose, with black bristles.

Thorax, pleura, and scutellum black, dense gray pollinose; pile of mesonotum mixed white and black, the bristles black; two whitish vittae, a faint brown median stripe and pale brown margining the white vittae on the outside. Posterior mesonotum and scutellum long white pilose, the scutellum with four black bristles. Pleura white pilose. Stems of halteres yellowish, the knob black, gray pollinose.

The black ground color of the abdomen entirely concealed by whitish gray pollen, the dorsum with long silvery white pile; pile of venter shorter and not so dense. Genitalia characteristic in form, mostly white pilose, a few black hairs on the hypandrium; the upper claspers long and curved. (Fig. 146.) Femora black, gray pollinose, white pilose; no bristles on front and middle femora, the bristles of legs black; tibiae yellowish except tips; first tarsal joint yellowish at base, the other joints black. Wings hyaline, the stigma brown, veins black except at base of wing and along costa; cell M–3 closed; a short stump of a vein near the furcation of Rs in the type.

Female.—Length 10.5 mm. Very nearly like the male. Body entirely pollinose and almost wholly gray. (Frons and mesonotum slightly greased.) Frons dull pollinose, the upper part apparently brownish gray, the lower third silvery gray pollinose; pile of upper frons and vertex black, all the rest of the pile of the head white.

Pile of mesonotum largely short, reclinate, and white, but there are a few short black pile in the median portion. Abdomen black in ground color and almost wholly gray pollinose; on the second, third, and fourth segments a basal, dark-brown, semicircular mark, narrow on the sides and divided by a median grayish line; first four segments with short reclinate white pile, the rest of the abdomen with short erect black pile. Wings gray hyaline, with cell M–3 wide open in both wings of the type specimen.

Type localities.—Peaceful Valley, Colorado, and Aweme, Manitoba, Canada. Holotype, a male, collected at Peaceful Valley, Colorado, August, 1919 (T. D. A. Cockerell), and allotype, a female, collected at Aweme, Manitoba, Canada, June 13, 1911 (E. Criddle).

Types.—Holotype in the United States National Museum, Cat. No. 25937. Allotype in the Philadelphia Academy of Natural Sciences.

There is a male paratype in the Academy of Natural Sciences in Philadelphia collection, taken with the allotype at Aweme, Manitoba. The species is closely related to *candidata*, *cinerascens*, and *vialis*. The male is easily recognized by the peculiar structure of the genitalia. It is evidently a northern form and may have a rather wide distribution.

THEREVA BELLA Kröber.

Plate 11, fig. 137.

1914. *Thereva bella* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 64.

Male.—Length 9.5 mm. Head black; frontal triangle and face silvery white pollinose and white pilose, the pile rather sparse. Antennae blackish brown, the tip of the second and base of the third joint yellow; third joint slightly longer than the first (fig. 137); first joint with black bristles and white pile. Palpi yellow, with white pile; proboscis largely yellow. Occiput white pollinose and pilose, the post-ocular bristles black. Pile on the ocellar tubercle black.

Mesonotum gray pollinose, the anterior and lateral portions paler, with faint indications of two light gray vittae; the pile is reclinate, golden yellow, and erect, black, and whitish, whitish on the margins. Thoracic bristles black. Scutellum gray pollinose, the base darker, with yellowish pile and four black marginal bristles. Pleura gray pollinose and white pilose, the pile near the wing base yellowish. Halteres yellow, the base of the knob brown.

Abdomen more or less reddish yellow in ground color, thinly gray pollinose and silvery white pilose. The venter and genitalia almost wholly reddish yellow, the pile on the genitalia more yellowish. On the dorsum of the abdomen a dark-brown or blackish spot at the base of the second to the fifth segments and near the middle. Structure of the genitalia near that of *candidata*, the upper portion projecting some distance beyond the hypandrium. Coxae and trochanters black, the former gray pollinose; legs almost wholly yellow, the tips of tibiae, apices of first three tarsal joints, and all of the last two tarsal joints blackish; empodia yellowish. Pile of femora sparse and white; legs with black bristles, the small setulae of tibiae and tarsi yellow. Wings hyaline, with a yellowish tinge, the veins and stigma yellow; cell M–3 open in the margin.

Female.—Length 8 to 10.5 mm. Very closely resembling the male, but the body more golden yellow pollinose than gray. Upper two-thirds of frons golden brown pollinose and short black pilose; lower frons and face silvery gray pollinose and golden yellow pilose. Pile of first antennal joint largely black.

Mesonotum slate-gray pollinose, with a rather dense covering of short tomentumlike golden pile, the short erect pile black. Base of scutellum slate gray, the margin paler, the pile golden yellow. Pleura gray pollinose, the pile mixed yellow and whitish.

Abdomen blackish in ground color, bright golden yellow pilose, the base of second and third segments broadly dull black, narrower on the fourth; the fourth and fifth with a median basal black spot; eighth segment shining blackish brown, the terminal circlet of spines

reddish yellow and quite long. The legs as in the male, in one specimen with some blackish color on the femora. Wings with cell M–3 widely open.

Type.—In Kröber's collection.

Distribution.—Three males and three females were examined, from the following localities:

Massachusetts: Sharon, August 25 [B. S. N. H.].

Connecticut: Waterbury, September 26, "on foliage" (C. H. T. Townsend), [U.S.N.M.].

Rhode Island: Kingston, July 20 [C. W. Johnson].

New Jersey: Delaware Water Gap, July 15 [C. W. Johnson]; Ridgewood, August 8 (M. D. Leonard), [R. C. Shannon].

Pennsylvania: Allegheny County, Jeanette [both Carnegie Mus.]

THEREVA ALBIFRONS Say.

1829. *Thereva albifrons* Say, Journ. Nat. Sci. Phila., vol. 6, p. 156.

Coquillett considered *albiceps* Loew the same as *albifrons*, and some other dipterists have come to this conclusion, with which I can not agree. C. W. Johnson has loaned a specimen of what is taken to be *albifrons* Say. The specimen is described below:

Male.—Length 9.5 mm. Black, largely gray pollinose and white pilose. Antennae rather short and thick; the first joint a little wider than the third and scarcely as long, the style short and blunt; second joint considerably narrower than either the first or third. Bristles of the antennae black, the pile white. Upper corner of frontal triangle and a narrow line between the eyes dull black, the rest of the frons white pollinose and pilose. Face, cheeks, and occiput white pollinose and pilose. Post-ocular bristles black. Palpi and proboscis black, with white pile.

Thorax black, gray pollinose and thinly white pilose. The mesonotum is slightly greased in the specimen described, but there are evidently two narrow, widely separated white vittae and a darker median stripe. Scutellum black, gray pollinose and white pilose; there are evidences of only two marginal bristles. All the thoracic bristles black. Pleura gray pollinose and white pilose. Halteres largely yellowish, the base of the knob blackish.

Abdomen black, densely gray pollinose and silvery white pilose, the pile longer and more erect on the sides of the first three segments. Second and third segments with a white posterior margin. Venter like the dorsum. Genitalia rather small, black, the upper forceps gray pollinose and with a narrow yellow margin; the hypandrium very short. Coxae all gray pollinose and white pilose. Femora black, gray pollinose and with rather short white pile. Knees and most of tibiae and tarsi brownish yellow, the apices of tibiae and tarsi blackish. Bristles of the legs black. Wings hyaline, the veins

blackish brown and strong; stigma brown; cell M–3 open but narrowed in the margin.

The specimen described was taken at Springfield, Massachusetts, May 19, 1915 (R. T. Webber), and is in the collection of the Boston Society of Natural History.

Type locality.—Indiana.

Type.—Not in existence.

THEREVA ALBICEPS Loew.

1869. *Thereva albiceps* Loew, Berlin. Ent. Zeit., vol. 13, p. 166.

A gray, white pilose species, the head wholly snow-white, antennae black. Differing from *candidata* in having the knob of the halteres brownish black. Abdomen of male white pollinose and pilose. Loew gives British America (Scudder) and Red River (Kennicott) as the habitat.

Type localities.—"British America and Red River."

Types.—In the Museum of Comparative Zoology at Cambridge.

Through the kindness of Mr. Nathan Banks, of the Museum of Comparative Zoology at Cambridge, I am able to establish the identity of this species. One specimen, a female, was loaned from the collection of the Museum. This unidentified specimen was from the Loew collection and bears the label "British America, Scudder." One of Loew's types had this same label and, as the original description fits the specimen examined, there seems to be no doubt of the identification. The following notes are made from the examination of the specimen:

The third joint is missing from both antennae, but the first joint differs from that of *albifrons*, being longer and more slender, not much wider than the second joint. There are three dark-gray vittae on the mesonotum, or areas set off by two widely separated longitudinal white stripes; on the outer side of the white stripes there is a line of brownish pollen. There are four scutellar bristles. Stem of the halteres brownish yellow, the knob blackish brown. The pile of the abdomen is sparse and white on the first three segments, short, erect, and black on the others. The abdomen is as described by Loew, the second, third, and fourth segments with the broad basal brown mark divided by a gray median line. The wings are whitish hyaline, the veins yellowish on the basal third.

THEREVA PACIFICA, new species.

Plate 11, fig. 133.

Male.—Length 8 mm. Head and appendages black, with black pile and bristles; pile of lower occiput and cheeks dense. Third joint of antennae slighty shorter than the first and quite slender, narrower than the first or second, the arista short (fig. 133); first two

joints of antennae, base of third, face, and most of occiput gray pollinose; upper corner of frontal triangle velvety black.

Thorax, scutellum, and coxae dull black, thinly gray pollinose and black pilose; black pile of anterior part of thorax and the scutellum dense and erect. Halteres blackish, the knobs gray pollinose.

Abdomen black, gray pollinose and silvery white pilose; pile on first segment erect white, silvery on the posterior margin, the rest of the pile on the dorsum reclinate and dense. Hypandrium black and densely pilose, some of the hairs black; the structure of the genitalia close to *vialis* Osten Sacken. Venter very sparsely pilose. Legs with black bristles. Femora black, black pilose; most of tibiae and base of tarsi yellowish, the tip of tibiae and most of tarsi black. Wings whitish hyaline, veins brown, stigma narrow and brown, cell M–3 closed and short petiolate.

Female.—Length 9 mm. Quite different in general appearance from the male. Antennae about the same in structure, the pile at the base of the first joint white. Bristles of antennae and occiput black. Upper frons with short black pile, a few black hairs on the lower frons; lower frons and face silvery white pollinose, the former largely white pilose, the latter entirely so; upper frons grayish brown pollinose; between the two colors of the frons a velvet black line, wider at the sides. Occiput, cheeks, and palpi white pilose.

Thorax black in ground color, obscured by dense gray pollen on the dorsum, pleura, coxae, and scutellum; two vittae and the lateral margins paler; pile of mesonotum very sparse, reclinate, and white; pile of the pleura and coxae white. Halteres as in the male.

Abdomen black, but only the eighth segment shining, other segments with a dense covering of gray and brown pollen; base of third and fourth segments semishining brown and spots on the anterior corners of fifth and sixth segments. Pile on the basal segments black, a few erect black hairs on the dorsum of the third and fourth, most of the fifth segment black pilose, and all of the sixth, seventh, and eighth. Legs colored as in the male, with reclinate silvery white pile on the femora and a few erect white hairs. Wing membrane white or whitish hyaline; cell M–3 closed in the margin of the wing.

Type locality.—Pacific Grove, California, on the upper beach, May 8, 1906 (Dr. J. M. Aldrich).

Types.—Male, Cat. No. 25938, U.S.N.M.; allotype, female, in same.

There is a male paratype, taken at the same time with the types, in the National Museum collection. The species is easily distinguished in the male by the densely black pilose head and thorax, contrasting with the silvery white abdomen. The wings are noticeably whitish, especially in the female. It is undoubtedly a sand-dune species of local distribution, like the following new species.

THEREVA VANDUZEEI, new species.

Plate 10, fig. 123; plate 11, fig. 135; and plate 12, fig. 157.

Male.—Length 9 mm. Head black in ground color, the upper corner of frontal triangle velvety black, the lower part of frons and the face silvery white pollinose and yellowish pilose, the pile not very long or dense. Cheeks and occiput white pollinose, the upper occiput yellowish pilose, the lower occiput and cheeks white pilose, a few black hairs at the lower corner of the eye. Antennae black, the first two joints gray pollinose and with black bristles, third joint slightly shorter than the first and distinctly narrower (fig. 135), the arista short. The ocellar tubercle is dull brownish black; bristles of the occiput black.

Thorax black in ground color; dorsum light-gray pollinose, with three broad brown vittae, the central stripe narrowing and almost disappearing before the scutellum, the lateral stripes not reaching the front or rear of the dorsum; bristles of the thorax and the four bristles of the scutellum black. Mesonotum with golden-yellow reclinate pile, more erect in the anterior portion, the central part interspersed with erect black pile. Scutellum gray pollinose and rather long erect yellow pilose. Pleura gray pollinose, with yellowish pile before the halteres and wings, the rest of the pile white. Halteres black, the knob somewhat grayish pollinose and showing a trace of yellow color at the tip.

Abdomen black, densely gray pollinose and white pilose, the pile dense, reclinate, and silvery on the dorsum. Genitalia black, gray pollinose, largely white pilose, with some yellow hairs above and a few black hairs on the projections of the hypandrium. The epiproct much larger than the lower plates of the genitalia. Femora black, gray pollinose and white pilose; front femora with one black bristle below near the middle, middle femora with two, the hind ones with five or six; tibiae yellowish with blackened tips; base of the first tarsal joint yellowish, the other joints black. Wings whitish hyaline with a black stigma, costa to wing tip and R–1 yellow, the other veins black; cross veins and fork of Rs clouded blackish gray; cell M–3 narrowly open, first A closed in the margin; M–1 and M–2 very close together at the base or actually touching, there being a good deal of individual variation in this character. (Fig. 157.)

Female.—Length 10 mm. Very nearly like the male. The frons pale brown pollinose above, silvery white on the lower part, on each side near the middle a triangular velvet black spot, almost meeting in the center of the frons to form a band. Pile of head colored as in the male. Upper frons with a few black hairs mixed with the yellow. Bristles of antennae much shorter than in the male. Pile of the abdomen short, white, and reclinate on the first four segments, on

the remainder short, erect, and yellowish. Base of first, second, third, and fourth segments broadly blackish gray and destitute of pollen, a very narrow border on the fifth; a narrow brownish posterior margin on the fifth, sixth, and seventh segments, the eighth wholly brownish.

Type locality.—Golden Gate Park, San Francisco, California, June 6, 1921 (E. P. Van Duzee).

Type.—Male and allotype female, in California Academy of Sciences; there are several paratype males and females taken at the same place on June 15, 1921 (Cole); a pair of these are deposited in the U. S. National Museum, No. 25939. There are two males in the collection of the California Academy of Sciences, one taken with the types and one July 10, 1920 (E. P. Van Duzee).

The species is named for E. P. Van Duzee, who made the trip to Golden Gate Park with the writer and collected the first specimen.

The species is probably local, being confined to the great sand-dune country around the edge of Golden Gate Park. Some of the specimens were taken on the wind-swept areas some distance from any vegetation. In no other species examined has there been found such a variation in vein M–1 and M–2, cell M–2 being petiolate in some specimens and broadly open in others. In one female the cell first A is narrowly open and there is an adventitious cross vein in the cell first M–2.

THEREVA NIVEIPENNIS Kröber.

Plate 11, fig. 134, and plate 12, fig. 160.

1914. *Thereva niveipennis* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 66.

Male.—Length 9 mm. A species closely allied to *vanduzeei*. Head grayish white pollinose and largely white pilose, a few black hairs on the upper corner of the frons, and the pile of the ocellar tubercle black. Post-ocular bristles yellow, but there are two black bristles near the middle and some distance from the eye margin; the pile of this upper portion of the occiput yellow. Antennae black, the first two joints gray pollinose, with whitish pile and bristles; third joint almost as long as the first two combined, the arista short. (Fig. 134.)

The larger part of the mesonotum brownish pollinose, with two wide whitish vittae; the median brown stripe inclosed by these has a darker central portion, widened in the middle; mesonotum with erect white and reclinate yellowish pile, the reclinate pile on the lateral margins, however, and before the scutellum silvery white. Scutellum gray pollinose with a dark-brown basal spot and erect dark-yellow pile; there are four marginal bristles. Pleura gray pollinose and white pilose. Stem of the halteres yellow, the knob blackish brown.

Abdomen gray pollinose with a yellowish tinge to the pollen; second and third segments with a white posterior margin. Pile of the abdomen almost wholly white, reclinate on the dorsum, yellowish on the basal portion of the second to the fifth. The base of the second to the fifth segments narrowly blackish brown, with a dark median triangle projecting from it on which the pile is black and short. The external genitalia are without distinctive structure, blackish brown in color, with whitish pile; the hypandrium small and with scarcely any projections. Most of the tibiae and base of the first and second tarsal joints yellowish; femora, tips of tibiae, and most of tarsi blackish. Legs white pilose, the minute pile or setulae on the tibiae and tarsi white. Most of the bristles of the legs black, but there are a few yellowish bristles on the tibiae. Wings whitish, the veins on the basal portion yellowish, beyond blackish brown; cell M–3 closed and petiolate; stigma brown; the wings with several blackish gray spots in addition to those on the cross veins and the spot on the fork of R–4 and R–5. (Fig. 160.)

Type locality.—Alameda, California.

Type.—In the United States National Museum, Cat. No. 25946.

Although closely allied to *vanduzeei* the antennae are of somewhat different structure, and there are other characters which make it a very distinct species. The entirely white setulae of the legs is an unusual character.

This species was first described as new by the writer, the change being made in galley proof after seeing Kröber's 1914 paper.

THEREVA JOHNSONI Coquillett.

Plate 10, fig. 119, and plate 11, fig. 142.

1893. *Thereva johnsoni* COQUILLETT, Can. Ent., vol. 25, p. 200.

Coquillett's description of the female will serve to identify it.

Type locality.—Washington (O. B. Johnson).

The type was probably returned to Professor Johnson, as it is not in the National Museum and was not recorded in the type book when other species in the same article were. This specimen may be in the University of Washington now.

The male is very nearly like the female and is described below:

Male.—Length 11 mm. Pile of the body considerably longer than in the female. Pile on upper frontal triangle long, black, on the lower frons and face dense, yellowish, very long on the face. Black pile of frons reaches almost to cheeks on the sides. Pollen golden yellow on the frontal triangle, yellowish on the face, golden above on the occiput, yellowish gray below. Post-ocular bristles black and slender.

Thorax and scutellum black in ground color, yellowish pollinose, the mesonotum with two faint paler vittae. Pile of mesonotum and scutellum long, erect, mixed black and yellow, the majority yellow. Pleura thinly gray pollinose, dense yellow pilose. Knob of halteres brown, the stem yellowish.

Abdomen black in ground color, entirely yellowish pollinose on the dorsum and venter; largely long, erect, yellow pilose, with a few long black hairs above on the last segment and the yellowish red genitalia; most of the pile of genitalia yellow, on the upper forceps shorter and largely black. Front and middle femora with rather long pile, mixed yellow and black. Wings as in the female, the base of the wing and the costa yellow.

Neallotype.—A male, collected at Northbend, King County, Washington, July 9, 1920 (E. P. Van Duzee), [Cal. Acad. Sci.].

Specimens examined.—Two males, ten females.

Distribution.—Distribution according to 2 males and 10 females examined is:

Washington: Northbend, King County, July 10 (E. P. Van Duzee); Forks, Clallam County, July 2 (E. P. Van Duzee), [both Cal. Acad. Sci.]; Ilwaco, July 7 (A. Spuler), [Cole]; Longmire, Rainier Park, July 27 (E. C. Van Dyke), [Cal. Acad. Sci.].

Oregon: "Ore." (Hy. Edwards), [Amer. Mus.]; Hood River, June 28 to July 5 (Cole), [Cole]; Forest Grove, June 7 (L. P. Rockwood), [R. C. Shannon].

California: Carrville, Trinity County, July 1 (Van Dyke), [Cornell]; Fallen Leaf Lake, June 21 (A. K. Fisher), [Biol. Surv.]; Sisson, July 26 (E. P. Van Duzee), [Cal. Acad. Sci.].

THEREVA BRUNNEA, new species.

Plate 10, fig. 120; plate 11, fig. 152; and plate 12, fig. 164.

Male.—Length 9.5 mm. Head black, the upper frons and upper occiput yellow-ochraceous pollinose; face, cheeks, and lower occiput gray pollinose; face, cheeks, and occiput very densely dark-yellow pilose, some black pile on lower corner of eye and some on upper part of frons, running part way down on the face; pile of vertex and the post-ocular bristles black. First joint of antennae distinctly longer than the third, the first two joints yellowish gray pollinose.

Thorax black, mesonotum dark-brown pollinose, with a median black line; the form of the thoracic vittae much as in *frontalis* Say—two brownish yellow stripes on each side of a median stripe. Mesonotum rather densely golden-yellow reclinate pilose, with some erect black pile. Scutellum black, the margin yellowish pollinose, yellow pilose, with a few black hairs and four black bristles. Pleura

gray pollinose and yellow pilose. Knob of halteres blackish, the stem yellow.

Abdomen black, shining except on the gray pollinose first segment; posterior margins of second to sixth segments golden-yellow pollinose, expanding on the sides of second and third; first to fourth segments yellow pilose, the pile long and erect at sides, reclinate above; the sides of fifth segment yellow pilose, the dorsum and all of the following segments long, erect black pilose. External genitalia blackish, black pilose, the internal organs reddish and golden-yellow pilose. Femora black, yellow pilose, with some long black pile on the outside of the front pair; tibiae, most of the first tarsal and base of other tarsal joints except last, yellowish; the tip of the tibiae blackish. Wings gray hyaline, with a small cloud at outside of cell first M–2 and a spot at furcation of Rs dark gray, the stigma blackish.

Female.—Length 10 mm. Very nearly like the male. Pile in general shorter, as is usual. Frons with a shining black callus reaching to the ocellus above but not to the eyes on the sides; dull black on the sides of the callus. (Fig. 120.) Abdominal segments one to three yellow pilose, the following segments short erect black pilose; segments two to seven with golden yellow posterior margins. Wings infuscated, especially along the veins and costal border.

Type locality.—Type, a male, and allotype, a female, the former collected at Victoria, British Columbia, July 3, 1919 (W. Downs), the latter at the same place, June 30, 1918 (W. B. Anderson).

Types.—In the Canadian National Museum.

The male type is teneral and is a bred specimen; the eyes are narrowly separated, but no doubt normal males would be holoptic.

Paratypes.—The following localities for 4 males and 13 females:

Canada: The type specimens above mentioned; Savary Island, British Columbia, August 11 (R. S. Sherman); Vancouver, British Columbia, August 9 (R. S. Sherman), [both Sherman coll.]; Vancouver, British Columbia, August 15 (R. C. Treherne); Chase, British Columbia, May 25 (W. B. Anderson), [both Canad. coll.]; Victoria, British Columbia, August 8 (R. C. Treherne), [Cole].

Washington: Forks, Clallam County, July 3 and 4 (E. P. Van Duzee), [Cal. Acad. Sci.].

Paratype.—Female, No. 25940, U.S.N.M.

THEREVA EGRESSA Coquillett.

1894. *Thereva egressa* COQUILLETT, Journ. N. Y. Ent. Soc., vol. 2, p. 99.

This species is related to *johnsoni* and is rather hard to determine from the description. No specimens were available for examination.

Type locality.—Colorado and California.

Type.—Male, No. 994, U.S.N.M., from Colorado.

THEREVA USTULATA Kröber.

1912. *Thereva ustulata* KRÖBER, Stett. Ent. Zeit., p. 265.

This species is said to be nearly related to *egressa* Coquillett. No specimens have been seen by the writer.

Type locality.—Laval County, Quebec, Canada.

Type.—Male, No. 24194, U.S.N.M.

THEREVA NIGRIPILOSA, new species.

Male.—Length 10.5 mm. A dull-black species, almost entirely black pilose. Head black, occiput gray pollinose, the face and frons thickly whitish pollinose; frons, occiput, cheeks, and outer rim of face long black pilose, most of the face whitish pilose.

Thorax black, gray pollinose, brownish on the mesonotum, with two faint vittae and the scutellum brown; pile of mesonotum long, erect, and black, the bristles black; pleura thickly black and white pilose. Halteres black, the stem a little paler.

Abdomen black, first segment thinly gray pollinose, the others black and shining or semishining; posterior margins of segments two to six narrowly yellow pollinose. Genitalia in part reddish, black pilose. Pile of venter on first three segments whitish, all the rest of the abdominal pile long, black. Femora black, black pilose, and bristled; tibiae reddish, the tips blackish; first tarsal joints largely yellowish as well as base of second joint of hind tarsi, the other joints black. Wings grayish hyaline, with a black stigma, the costal region and a spot just beyond the cell first M–2 smoky; cell M–3 closed in margin, R–4 gently curved.

Type locality.—Holotype, a male, bred from larva at Victoria, British Columbia, June 15, 1919 (W. Downs), [Canad. coll.].

Type.—In the National Canadian collection.

Paratypes.—Two paratypes were examined, both collected at Cranbrook, British Columbia, 3,500 feet, June 2 (C. Garrett). One specimen is deposited in the National Museum (No. 25942), the other is in the collection of Mr. C. H. Curran.

This species is in the group with *comata*, *nebulosa*, and *aurofasciata;* it differs from *nebulosa* and *comata* in the less spotted wings, the large extent of the black pile, etc.

THEREVA COMATA Loew.

Plate 10, fig. 131; plate 11, fig. 151; and plate 12, fig. 161.

1869. *Thereva comata* LOEW, Berlin. Ent. Zeit., vol. 13, p. 7.

Type locality.—California.

Type.—In the Museum of Comparative Zoology at Cambridge.

Without examining the type it is impossible to identify this species with certainty. Grouped around the species we have a complex

which is difficult to work out without extensive collecting; we see such a group around *Villa* (*Anthrax*) *alpha* in the Bombyliidae, and we have the old problem of distinguishing between species, subspecies, and races or varieties.

In the forms related to *Thereva comata* the external male genitalia are apparently identical and the differences are more of coloration than structure. In some specimens there are six to eight strong bristles on the outside of the hind femora and in others there are fewer or none. The tips of the femora are reddish in some, and three specimens, possibly distinct species, from the Sierra Nevada Mountains in California (Hy. Edwards), [Amer. Mus.], have the femora and the pile of the body largely yellow; there is a narrow black band across the frons of the female and the hind femora lack the bristles on the outside. Specimens from Pismo and San Miguel Island, California, possibly form a distinct subspecies or race; they have more black pile on the body than the others, entirely black femora, the tergum of the abdomen largely dull black, without pollen, and the venter gray pollinose.

Kröber describes *comata* as having pollinose bands on the abdomen in addition to the yellowish incisures. I have examined a series of 18 specimens of what I take to be the typical form and in these the venter is gray pollinose. The male genitalia are small, the hypandrium much reduced and with yellow pile. The fourth to seventh tergites of the male abdomen have more or less brownish yellow pollen on the posterior borders; in the female the fourth and fifth abdominal tergites have gray pollinose borders. The female frons is golden yellow pollinose, black pilose, except above the antennae, and with a narrow shining black band interrupted in the middle by the yellowish pollen.

Specimens examined.—22 males, 5 females.

Washington: Wawawai, July 8 (R. C. Shannon), [Shannon].

California: Stanford University, May 17 to 25 [Stanford U.]; San Francisco (H. Edwards); "Cal." (Osten Sacken), [M. C. Z.]; "Cal." (E. T. Cresson), [A. N. S. P.]; Compton, April 15 (Cole); Stanford University, May 15 (Cole), [Cole]; Pismo, April 14 to 25 (E. P. Van Duzee); San Miguel Island, April 14 to May 20; Salada Beach, San Mateo County, May 25 (E. P. Van Duzee); Santa Cruz, June 3 (E. P. Van Duzee); sand dunes near San Francisco, May 31 (C. L. Fox); San Francisco, April 11 (C. L. Fox), [all Cal. Acad. Sci.]; Pasadena, [U.S.N.M.].

THEREVA NEBULOSA Kröber.

1912. *Thereva nebulosa* KRÖBER, Stett. Ent. Zeit., p. 264.

Type locality.—California.

Type.—In the collection of Kröber.

From the description this species is very close to *comata*. I have seen eight males of a form that would answer the description of this species. The abdomen is shining black above and below, the posterior margins of segments two to five bright golden yellow and quite broad. The legs are strongly bristled, especially the hind femora and tibiae, there being eight or nine strong bristles on the outside of the hind femora. The following distribution is known:

Washington: W. Wash. Terr. (H. K. Morrison), [U.S.N.M.].

California: Pacific Grove, May 8 (J. M. Aldrich), [Aldrich]; Carmel, Monterey County, May 2 (L. S. Slevin); Santa Cruz, June 3 (E. P. Van Duzee), [both Cal. Acad. Sci.].

THEREVA FOXI, new species.

Male.—Length 8.5 mm. A species related to *comata* Loew and very near *nigripilosa* described above. It differs from the latter species in having more bristles on the first antennal joint, the face more blackish pilose. The vittae on the mesonotum yellowish brown and very distinct. Stem of halteres blackish. Pleura with more black pile than *nigripilosa* or *comata*, the abdomen shining black much as in *nebulosa*. The projections of the hypandrium are very short. Wings with distinct brown clouding along the veins and cross veins, all the veins black or blackish brown.

Type locality.—Holotype, a male, collected at Paradise Valley, on Mount Rainier, Washington, August 7, 1919 (C. L. Fox).

Type.—In the California Academy of Sciences.

There is a male paratype in the collection of the California Academy of Sciences taken in the type locality July 30 by Mr. Fox. The wings do not have the brownish tinge common to *comata* and lack the distinctly mottled appearance.

THEREVA AUROFASCIATA Kröber.

1912. *Thereva aurofasciata* KRÖBER, Stett. Ent. Zeit., p. 263.

The following is a translation of the original description:

Male.—Vertex gray-brown pollinose, frons and face more grayish. The long, thick, black pile of frons reaches almost to lower corner of eye. Face long white pilose, on eye angle a black tuft. Antennae black, black bristled, base of third joint reddish. Occiput gray, below long and woolly whitish yellow pilose. Orbital bristles black. Thorax blackish brown, yellowish brown pollinose, long and thick erect blackish brown pilose. Scutellum like the thorax. Stripes lacking on both. Pleura whitish pilose. Halteres blackish brown, stem paler. Abdomen shining blackish brown, unusually thick and long pilose. Second to sixth segment with sharply marked yellowish gray pollinose bands, which on each segment become broader. Second to fourth segments with orange-yellow borders. Pile of abdomen above blackish brown, on the sides and venter long, erect, rather thick whitish pilose, on the apex reddish yellow. Anal lamellae reddish yellow. Venter black, through pollen dull yellowish gray. Second to fifth segments with broad yellow bands which, however, on account of pale pollen do not appear so heavy. Wings

tinged brownish; cross veins and fork brownish bordered. Stigma rather dark brown. Femora blackish brown; the four first ones long erect pilose, blackish brown or light according to the illumination. Hind femora sparsely short reclinate pilose. Tibiae and tarsi yellowish brown, the tips darkened. Length 13 mm.

Type locality.—Southern Colorado.

Type.—In the Hofmuseum, Vienna.

The National Museum contains a male specimen, determined by Kröber, from Wisconsin.

THEREVA FRONTALIS Say.

Plate 10, fig. 121, and plate 11, fig. 150.

1824. *Thereva frontalis* SAY, Long's Exped. to St. Peters River, vol. 2, p. 370.

Type locality.—"N. W. Territory."

Type.—Not in existence.

The species is redescribed below:

Male.—Length 10 to 11 mm. Head black, gray pollinose, the upper corner of frontal triangle black; frons black pilose. Face and occiput white pollinose, the outer margin of face and a spot beneath the eye black pilose, the rest of face and occiput white pilose. Palpi brown, white pilose. Bristles of occiput black. The antennae black, first joint about the length of third ,gray pollinose, with black pile and bristles.

Thorax black, gray pollinose; mesonotum with a median blackish brown stripe and two indefinite whitish vittae, on the outer side of which is some brown pollen. Scutellum gray pollinose with very fine blackish pile and four black bristles. Pile of mesonotum erect and blackish. Pleura gray pollinose, white pilose, with a few black hairs in the cluster of pile before the base of wing. Stem of halteres yellowish, the knob black, largely gray pollinose.

Abdomen black, largely gray pollinose, the hind margins of second, third, and fourth segments narrowly whitish; base of first to sixth segments with a large, semicircular blackish brown spot, rounded posteriorly and almost reaching the posterior margin. Genitalia blackish on the exterior, the hypandrium with very short projections (fig. 150) and yellow pilose, the upper portion with black pile on the outside. Sixth and seventh segments black pilose; the first to fifth black pilose on the dorsum, white on the sides, long, erect, and rather sparse. Venter gray pollinose, the posterior borders of segments two to five yellowish white; pile of the first four segments white, beyond this black. Femora black, the short reclinate pile of the hind pair black, a few erect white hairs at the base; pile on the four front femora largely long, erect, black, a few white hairs above; knees yellow; tibiae yellow with black tips; most of the tarsi black, the first joint and sometimes the base of the second yellowish.

Wings hyaline, the veins light brown, stigma brown, the cross veins and fork of Rs clouded brown; cell M–3 closed near the margin.

Female.—Length 11.5 to 13 mm. Very nearly like the male. Pile of head and mesonotum much shorter. Frons yellowish gray pollinose and black pilose, with a large, reverse heart-shaped, shining black callosity, reaching the ocellar tubercle above and joined to the eyes on the sides by a dull black mark. (Fig. 121.) Upper occiput yellowish gray pollinose; face and lower occiput white pollinose and pilose. Some black pile at the lower corner of the eye.

Mesonotum gray pollinose on the lateral margins, the main portion dark brown, with two wide yellowish white vittae, so that an appearance is given of three wide dark-brown vittae. Base of scutellum brown, the larger part gray pollinose. Mesonotum with short reclinate yellow pile in addition to the erect black pile, the reclinate pile continued on to the scutellum.

Abdomen shining black; first segment gray pollinose, segments two to six with narrow yellowish posterior borders and a gray pollinose area anterior to this, narrow in the middle of the dorsum and expanded on the sides. The black portions of the first three segments reclinate blackish pilose, the rest yellowish white; all pile beyond the third segment short, erect, black. Genitalia shining black, the circlet of bristles yellowish red. Legs colored as in the male, the pile of femora much shorter and whitish. Veins of wing largely with a narrow border of pale brown, more distinct on the cross veins.

Distribution.—Distribution according to 4 males and 24 female specimens:

Two female specimens taken in the Hope Mountains, British Columbia, July 19 (R. S. Sherman) and one specimen from Paradise Valley, Mount Rainier, Washington, July 17 (E. C. Van Dyke), may prove to be different; in these specimens the frontal callosity is divided in the middle by an impressed line, on either side of which it projects into a hemispherical body. It is in general a darker form, with the markings of the wings darker.

Canada: Ile de Montreal, July 14 (Beaulieu); Ottawa, Ontario July 9 (Beaulne); Rigaud, Quebec, June 27 (Beaulieu); Lillooet, British Columbia, May 26 and September 6 (W. B. Anderson), [all Canad. coll.]; "Canada" (Osten Sacken), [M. C. Z.]; Hope Mountains, British Columbia, July 19 (R. S. Sherman); Similikameen, British Columbia, July 20 (R. S. Sherman), [Sherman]; Montreal, Quebec, June 17 [Amer. Mus.]; Kearney, Ontario, July 2 to 8 (M. C. Van Duzee), [Van Duzee]; Jordan, Ontario, June 29 (C. H. Curran), [Cole].

New Hampshire: Mount Washington, August 7 (C. W. Johnson), [Cole].

Massachusetts: "Mass." (Osten Sacken), [M. C. Z.]; Rutland, June 5 (C. W. Johnson); Brookline, June 17 (C. W. Johnson); Waltham, June 14 (C. W. Johnson), [Cole].

New York: North Elba, July [Amer. Mus.]; Ithaca, July 2; Slaterville, June 14 [both Cornell]; Gowanda, June 14; Lancaster, June 30 [both M. C. Van Duzee].

Illinois: "Illinois" (Osten Sacken), [M. C. Z.].

Michigan: Agricultural College, June 5 to July 12 [Cornell]; Pequaming, July 11 and 28 (M. Hebard), [Harrisb. coll.].

Colorado: Spanish Peaks, June 15 (Osten Sacken), [M. C. Z.].

Idaho: Moscow Mount, June 23 (Cole), [Cole].

Washington: Paradise Valley, Mount Rainier, July 17 (E. C. Van Dyke), [Cal. Acad. Sci.].

THEREVA FLAVICINCTA Loew.

1869. *Thereva flavicincta* (male) and *gilvipes* (female) LOEW, Berl. Ent. Zeitschr., vol. 13, p. 168.

Type localities.—The type males were described from northern Wisconsin and White Mountains, New Hampshire, the female (as *gilvipes*) from Massachusetts.

Types.—In the Museum of Comparative Zoology at Cambridge.

The one male examined was 10 mm. in length, the genitalia rather small, yellowish brown, with yellowish white pile. The female is 10.5 to 12 mm. in length; the frontal callus heart-shaped, deeply notched below, with a dull black mark joining to the eyes on each side as in *frontalis*. The species has been reported from New Jersey.

Distribution.—The following distribution is known for the species:

Canada: Ridgway, Ontario, June to July 20; Fort Erie, July 5; Kearney, July 8 (all M. C. Van Duzee), [Van Duzee].

New Hampshire: White Mountains (Geo. Dimmock), [Cole]; White Mountains (Osten Sacken), [M. C. Z.]; Bretton Woods, June 30 (M. C. Van Duzee), [Van Duzee].

New York: Little Valley, June 30; Protection, June 16 (both M. C. Van Duzee), [Van Duzee].

THEREVA FLAVICAUDA Coquillett.

1904. *Thereva flavicauda* COQUILLETT, Invertebr. Pacifica, vol. 1, p. 23.

Type.—Female, No. 6710, U.S.N.M.

The only specimens known to the writer are the type and paratype females in the National Museum, taken in Ormsby County, Nevada.

THEREVA DUPLICIS Coquillett.

Plate 10, fig. 122; plate 11, fig. 148; and plate 12, fig. 159.

1893. *Thereva duplicis* COQUILLETT, Can. Ent., vol. 25, p. 198.

Type localities.—Coquillett's material was from South Dakota and Montana. The types are in the National Museum collection.

Type.—Male, No. 10422, U.S.N.M., from Brookings, South Dakota; an allotype female from same place, and a paratype from Montana.

Distribution.—The distribution according to eight males and two females examined is: Canada: Regina, July 25 (T. N. Willing); Regina, July 8 (J. Fletcher); Duadum, July 15 (A. E. Cameron); Saskatoon, July 11 (A. E. Cameron); Prince Albert, July 16 (J. Fletcher), (all in the Province of Saskatchewan); Aweme, Manitoba, July 1 to August 4 (N. Criddle), [all specimens in Canad. Nat. collection.].

THEREVA DIVERSA Coquillett.

1894. *Thereva diversa* COQUILLETT, Journ. N. Y. Ent. Soc., vol. 2, p. 100.

This species was not found in any of the material sent in for examination. Kröber states that the halteres are reddish yellow. The type material is probably not all one species.

Type localities.—Colorado, Montana, and Florida.

Type.—Male, No. 995, U.S.N.M., from Colorado; allotype, female, from same; four cotype males from Colorado (2), Montana, and Florida.

THEREVA CINGULATA Kröber.

Plate 11, fig. 155.

1912. *Thereva cingulata* KRÖBER, Stett. Ent. Zeit., p. 267.

The original description is as follows:

Female.—Frons and vertex yellowish brown pollinose, sparsely weak blackish brown pilose. Face white pollinose and pilose. Antennae blackish brown; yellowish gray pollinose, black bristled. Second joint and base of third reddish. The callus is a triangle, whose tip reaches the front ocellus and in which a pubescent wedge is pushed in at the base. Inasmuch as the tip of the callus is buried under pollen, one might say that it is composed of two triangular spots. Occiput above yellowish brown; below white pollinose and pilose. Post-ocular bristles black. Thorax thickly yellowish brown pollinose, opaque, with dull brownish vittae, the middle one divided by a red brown, strongly colored line, which reaches to the scutellum. Pile reclinate yellow, erect blackish brown. Pleura light gray, snow-white woolly pilose. Halteres brownish, the stem paler. Abdomen shining black. First segment yellowish gray pollinose, golden yellow pilose. Second to sixth segments with yellow pollinose bands, which on the anterior segments are considerably expanded laterally. The last segment principally reddish yellow, shining. Pile on all light parts pale yellow, on the dark parts blackish brown. Venter at the base whitish gray, then light yellow, then brownish yellow. Pile on the first segments long and white, on the last short, almost golden yellow. Femora blackish brown, tips darkened. Wings hyaline; the cross veins and fork clouded pale brownish. Fourth posterior cell closed. Length 10 mm.

Type locality.—Colorado.

Type.—In the Hofmuseum, Vienna.

The writer has seen several specimens which seem to answer the description of this species; one of the males is designated as a neallotype and is described below:

Male.—Length 9 mm. In general darker in color than the female. The pollen of the frons gray with a yellowish tinge. Pile of the face largely whitish, that on the outer margin erect, black, and reaching to the cheeks. Pile of frons black and considerably longer than in the male.

Thorax darker than in the female, less distinctly marked, the mesonotum in general more slate colored. Pile of mesonotum and scutellum largely black, erect, and rather long, with some shorter yellow pile. Pile of pleura largely yellowish white.

First segment gray pollinose; posterior margins of segments two to six yellowish, with yellowish gray pollen which widens out laterally. Venter colored much like the dorsum of abdomen, the yellow color and yellowish pollen more extended. Pile of dorsum sparse, black, rather long; pile on the venter yellowish. Genitalia yellowish red, the upper portion darker, the hypandrium with a long apical projection on each half (fig. 155), much longer than in any other species examined.

Neallotype.—A male, collected in the mountains near Sheridan, Wyoming (Wm. Metz), [U.S.N.M.].

The neallotype is from the collection of J. M. Aldrich. It is an imperfect specimen, but the only other male examined is in worse condition; the third joint is missing from both antennae and one of each pair of legs is gone, otherwise the specimen is well preserved.

Distribution.—The distribution according to two males and four females is:

Montana: Gallatin Mountains, August 15, 6,000 feet [Mont. Exp. Sta.].

Wyoming: Sheridan, in mountains (Metz), [U.S.M.N. and Pomona College].

Colorado: Veta Pass, June 27 [U.S.N.M.].

THEREVA NEOMEXICANA, new species.

Female.—Length 10.5 mm. Allied to *frontalis* Say and *cingulata* Kröber, perhaps nearer to *cingulata* than to any other described species, differing from this species in having the pile of the face and occiput distinctly yellow instead of white. Antennae black, gray pollinose, with short black bristles and yellowish pile; third joint about as long as first and scarcely wider. The shining frontal callosity reaching to the ocelli and with a deep wedge of golden-yellow pollen below.

Thorax black, pale brownish gray pollinose, with two whitish vittae and a very narrow dark-brown median stripe which widens posteriorly and crosses on to the scutellum; pile of the mesonotum mixed black and yellow. Scutellum gray pollinose and yellow pilose.

Pile of pleura and pectus yellowish. Stem of halteres yellowish, the knob brown.

Abdomen black, with posterior margins of second, third, and fourth segments very narrowly yellow above and more broadly on the venter, which is entirely gray pollinose. Sides and posterior borders of segments gray pollinose; first tergite with a small central portion colored brown; second, third, and fourth segments largely semishining blackish brown, also the basal half of the fifth and sixth; seventh segment shining black; genitalia black with a reddish tinge, the terminal circlet of spines reddish; a few black hairs on the genital segment, all the rest of the abdominal pile yellowish. Femora black, gray pollinose, sparsely yellowish pilose; bristles of legs black; tibiae except tips and base of tarsi yellowish, the rest of the legs black. Base of the wing yellowish, the costal margin, tip, and posterior margin infuscated; brown clouds on the cross veins, and a brownish gray margin to most of the veins, the centers of the cells whitish; cell M–3 closed near margin; veins blackish brown toward the posterior margin of the wing.

Type locality.—Rio Grande River, New Mexico (Oslar), [from the collection of W. G. Dietz].

Type.—Female, No. 25943, U.S.N.M.

Paratypes.—There is a paratype in the same collection from the arroyo Pecos River, New Mexico.

A male in the same lot of material may prove to be this species; the specimen was taken at Chimney Gulch, Colorado, near Golden. The wings are the same as in the above species and there are several other characters in common, but, as it is not a good specimen, it is better not described. The eyes are separated by the width of the ocellar tubercle, but perhaps this is an individual abnormality.

THEREVA STRIGIPES Loew.

1869. *Thereva strigipes* LOEW, Berlin. Ent. Zeitschr., vol. 13, p. 169.

Loew described only the female of this species.

Type locality.—Lake Winnipeg, Canada.

Type.—In the Museum of Comparative Zoology at Cambridge.

Distribution.—Kröber redescribed the species in his paper on the Therevidae of North America, giving the region around Lake Winnipeg and Colorado as the habitat. The species has been recorded from Axton, New York (O. A. Johannsen), and White Mountains, New Hampshire (Mrs. Slosson). One female in the National Museum collection, taken at Center Harbor, New Hampshire (H. G. Dyar), may belong here. C. W. Johnson kindly loaned a male and female for study, from which the following notes are made:

Male.—Length 10 mm. The specimen is evidently teneral and the thorax slightly greased. Frons and face grayish white pollinose, the

upper corner of frontal triangle dull brown. Pile of frons and outer margin of face long and black, on most of the face dense and white; some black pile on the cheeks below the eye. Antennae as described by Loew for the female.

Mesonotum gray pollinose with three indistinct brownish vittae, the median one divided by a darker brown line; pile of mesonotum rather long, dense, erect, and black. Pleura gray pollinose and dense white pilose, a few darker pile before the wing base. Coxae with dense white pile. Stem of halteres yellow, the knob brown.

Abdomen largely black in ground color, first segment gray pollinose, the tergites of other segments largely shining blackish brown; posterior margins of segments yellow, with a border of gray pollen widening laterally. The color of the venter is probably blackish brown in mature specimens with yellow posterior margins. Pile on sides of abdomen and on venter long and whitish, the dorsum largely black pilose; genitalia brownish with black pile above and white below. Four front femora blackish brown, the hind pair dark above, yellowish beneath; pile of femora largely white, intermixed with long black pile on the posterior side of the four front femora. Wings grayish hyaline; cell M–3 closed.

Female.—Length 13 mm. In the single specimen the upper two-thirds of frons is shining black and bare of pollen; in fresh specimens there may be a narrow pollinose line along the orbits; lower third of frons golden-yellow pollinose and black pilose. Face whitish pollinose, the white pollen reaching slightly above the base of the antennae; pile short and white, a few black pile on the outer margin above.

The mesonotum is dark-gray pollinose with a broad central blackish brown vitta reaching to scutellum and two broad stripes, one on either side, abbreviated before the humeri and scutellum and separated from the median stripe by a distinct yellowish pollinose line which broadens out anteriorly. Base of scutellum blackish brown, the broad margin gray pollinose, the pile yellow.

First abdominal segment gray pollinose, the rest of dorsum largely shining black; posterior margins of second to sixth segments bright golden yellow, just in front of which there is an area of yellowish gray pollen, widening laterally; third abdominal segment largely black pilose. Venter thinly gray pollinose, the pile and posterior margins as on the dorsum. Genitalia with a circlet of reddish spines. Middle pair of legs missing. Anterior femora blackish, brown at extreme base, the posterior femora blackish brown above and reddish below; pile of femora short and whitish. Costal cell of wing brown.

The male and female examined were from the following localities:

Vermont: Burlington, June 24 [B. S. N. H.].

New Hampshire: Glen House, July 3 [B. S. N. H.].

THEREVA HIRTICEPS Loew.

Plate 10, fig. 126, and plate 12, fig. 166.

1874. *Thereva hirticeps* Loew, Berl. Ent. Zeit., vol. 18, p. 382.

Male.—Length 9.5 to 12.5 mm. Ground color of body largely black. Frontal triangle yellowish pollinose, the upper margin narrowly black; a line of black pile on the frons next the eye margin, most of the frontal pile yellow. Face gray pollinose with dense whitish pile. Antennae black, the base of the third joint may be reddish; first joint about as long as the third, yellow pilose with black bristles; style short. Some black pile on the cheeks below the eye. Occiput largely gray pollinose, the upper part yellowish; pile below whitish, on the upper part golden yellow. A shining black line on the face from the base of the antennae to the oral margin.

Mesonotum shining black except for two yellowish vittae, widely separated, slightly divergent anteriorly and reaching as far as the prescutellar bristles posteriorly; in some specimens the lateral margins of the mesonotum are thinly grayish pollinose. Pile of the disk of mesonotum erect and blackish, around the lateral margins yellowish, dense over the wing base. Scutellum shining black, with long erect yellow pile, four marginal black bristles, and occasionally a few black pile. Pleura gray pollinose, largely whitish pilose, with a yellowish tinge to the pile before the halteres and wing base. Stem of the halteres yellow, the knob blackish brown.

Abdomen largely shining black, the posterior corners of segments one to six brownish yellow, the seventh segment and genitalia brownish yellow. Posterior margins of second to sixth segments bright yellow, with reclinate yellow pile on the second to fifth; sides of the first to fifth long erect yellow pilose; dorsum of the sixth, seventh, and genitalia black pilose. Posterior margins of second to sixth segments of venter bright yellow, the posterior halves of the same ventral segments brownish yellow, the basal part black. Pile of the venter yellow, including that below on the genitalia. Basal half of femora black, the apical portion, tibiae except apices, and base of tarsi reddish brown; tips of the tibiae and most of the tarsi black. Bristles of legs black. Pile of hind femora almost all tomentumlike and black, on the front femora mixed black and white, long, and erect on the outside and below, all black on the apical third. Veins at base of wing yellowish, black beyond; cell M–3 closed and short petiolate; stigma blackish brown; costal cell yellowish, the rest of the margin of the wing smoky gray, as are the clouds on the cross veins; central portion of the wings largely whitish hyaline.

Female.—Length 10.5 to 13 mm. Closely resembles the male, with the usual sexual differences. Frons and vertex yellowish pollinose, the shining black callosity reduced to a band touching the eye mar-

gin on either side (fig. 126); pile of the frons almost wholly black, except for a few yellow hairs above the antennae. First antennal joint with mixed black and yellow pile.

Pile of mesonotum shorter than in the male, with more yellow anteriorly and laterally; lateral margins and humeri distinctly gray pollinose, the thoracic vittae reaching the scutellum and merged with the pollen on the prescutellar callosities. The margin of the scutellum broadly yellowish white pollinose.

Abdomen marked nearly as in the male, the shining black portions of the dorsum with black pile, the pile of the lighter parts of the first four segments yellow, a few yellow pile on the sides of the fifth, the rest of the pile to the tip of the abdomen erect and black, both on the dorsum and venter; terminal circlet of spines black.

Reddish color of the venter more extended than on the dorsum. Femora, tibiae, and base of tarsi reddish brown, the trochanters and the larger part of the tarsi black; pile of the femora more sparse than in the male. Wings as in the male. (Fig. 166.)

Type locality.—San Francisco, California.

Type.—In the Museum of Comparative Zoology at Cambridge.

Loew described only the female of this species. A male neallotype is designated, the specimen collected on the sand dunes near Golden Gate Park, San Francisco, October 10, 1920, by E. P. Van Duzee, and is deposited in the collection of the California Academy of Sciences.

Distribution.—The distribution according to 12 males and 9 females examined is: California—San Francisco, August 18 (R. H. Smith); San Francisco, October 9 (J. A. Kusche); Colma, August 10 (J. A. Kusche); Ingleside, near San Francisco, October 14; sand dunes near Golden Gate Park, October 10 (E. P. Van Duzee), [all Cal. Acad. Sci.]; sand dunes near Golden Gate Park, October 10 (F. R. Cole), [Cole].

This species is more closely related to *fucata* than to any other described species, but is quite distinct in the marking of the frons, general coloration, etc. It is probably confined largely to the sand dune areas along the coast and is evidently an autumn species. A pair was taken in coitu on October 10 by the writer.

THEREVA PSEUDOCULATA, new species.

Plate 11, figs. 132 and 153.

Male.—Length 8 mm. Body black, densely gray or yellowish gray pollinose. First joint of antennae as long as the second and third combined (fig. 132), gray pollinose, with sparse pile and short black bristles; second joint and base of third usually yellowish. Bristles of occiput black and rather long and slender. Frontal triangle yel-

lowish gray pollinose, with long black pile in the median portion; face gray pollinose, largely black pilose, the pile in the middle portion yellow. Palpi yellowish with yellow pile. Pile of the occiput and cheeks yellowish and not very dense.

Thorax yellowish gray pollinose, with two faint vittae of paler color; pile of mesonotum yellowish white, with a few black hairs intermixed. Scutellum, pleura, and coxae thickly gray pollinose, the pile whitish. Halteres yellowish, base of knob brown.

Abdomen black, with narrow yellow posterior margins to segments two, three, four and five; densely gray pollinose, with sparse, rather long erect yellow pile. Venter as above. Genitalia reddish yellow, with rather long yellow pile, a few black hairs above and on seventh segment. (Fig. 153 for structure.) Femora blackish, more or less yellowish toward apex, the pile largely yellowish white, some black at the apex; tibiae and tarsi yellowish, darkened apically. Wings yellowish and gray hyaline, the stigma pale brown, most of the veins yellow, but brown in certain sections, as the at tips of the veins, the fork of Rs and the cross veins; cell M–3 narrowly open.

Female.—Length 9.5 mm. Resembles the male. Pile of face shorter and all yellowish, as on the cheeks and occiput; a few black hairs on the frons. The frons has two shining black hemispherical calli near the middle; pollen of frons and vertex golden yellow, that on the face and lower occiput white.

Thorax with sparse erect black hairs and reclinate yellowish pile. Mesonotum largely pale brownish gray, the two vittae and lateral margins paler brownish gray. Base of the scutellum broadly brownish. Abdomen black in ground color, posterior margins of the third to the last segment yellowish gray and yellow pollinose; posterior margin of the second segment whitish; the yellow color of the fifth broad, the segments beyond the fifth and the genitalia reddish yellow. Pile of the abdomen yellow, reclinate on the first two segments, erect on others; seventh segment and genitalia shining, with more or less black pile on the dorsum. Femora largely yellowish, darker above, the pile much shorter than in the male. Wings more brownish in color, the veins darker.

Type localities.—Holotype, male, collected at Brigham, Utah, July 4, 1911 (J. M. Aldrich), and allotype, female, taken at Salt Lake City, Utah, July 18, 1917 (J. M. Aldrich), [U. S. National Museum].

Type.—Male, Cat. No. 25944, U.S.N.M.

The holotype was taken on parsnip flowers, three male paratypes being taken at the same time.

Paratypes.—The distribution according to five males and four females is:

Colorado: Gunnison (C. F. Baker), [Stanford Univ.].

Montana: Dillon, July 8, on alfalfa [Mont. Exp. Sta.].

Washington: Wapato, May 11 (Cole), [Cole]; Yakima River, Nelson's, July 4, 1882 [M. C. Z.].

Utah: Brigham, July 4 (J. M. Aldrich), [U.S.N.M.]; allotype above mentioned.

The specimen from Yakima River has the first antennal joint yellow and is 10 mm. long. The Montana specimen is 11.5 mm. in length, with yellow femora and first antennal joint; the last four abdominal segments almost entirely yellow. The male collected at Wapato, Washington, has paler wings, whitish hyaline in spots; first antennal joint yellowish; a few black hairs on the sides of the face, the other pile dense-golden yellow.

THEREVA FUCATA Loew.

Plate 11, fig. 154, and plate 12, fig. 162.

1872. *Thereva fucata* Loew, Berlin. Ent. Zeit., vol. 16, p. 74.

This species has the first two antennal joints and base of third yellowish. The legs of the female are wholly yellow, largely so in the male. The thorax is shining black, with ochraceous pollinose vittae and lateral margins. The type, collected in California by Edwards, is in the Museum of Comparative Zoology at Cambridge, Massachusetts.

There are several closely related forms which might answer the description of this species; those seen by the writer are western in their distribution and are possibly all the same variable species or subspecies of the typical form. The wing of one type is shown in figure 162 and the male hypopygium in figure 154. Dissections of the male genitalia may reveal specific differences, but material is not available at present.

Loew describes the wings as having three unequal brown fascia, arcuate, and abbreviated anteriorly; only six specimens of this typical form were examined, one from Utah and five from California. Some specimens have less clouding in the wings than is shown in figure 162. A male from Little Bear Valley, California, has some differences in color and may prove to be a good species.

Distribution.—Distribution according to 6 males and 16 females is as follows:

Canada: Savary Island, British Columbia, August 23 (R. S. Sherman); Hope Mountains, British Columbia, July 27 (R. S. Sherman), [both R. S. Sherman]; Lillooet, British Columbia, September 8 (R. C. Treherne), [Cole].

Wyoming: Mountains near Sheridan (Wm. Metz), [Pomona College].

Colorado: Gunnison (C. F. Baker), [Stanford U.]; Leadville N. F., 25 miles from Buenavista, September 1 (A. K. Fisher), [Biol. Surv.].

Oregon: McDermitt, Malheur County, August 20 (J. R. Bunch), [Biol. Surv.].

Utah: Deer Creek, Provo County, August 27 (T. Spaulding), [C. W. Johnson].

California: Sugar Pine, Madera County, 4,300 feet, August 14 (J. C. Bradley), [Cornell]; Redwood Mdw., Tulare County, August 4 (J. C. Bradley), [Cornell]; Santa Clara County (Harkins); Stanford University, October 10; Santa Cruz Mountains [all Stanford U.]; Little Bear Valley, San Bernardino County, August [Cal. Acad. Sci.]; Mill Creek Canyon, San Bernardino County, 4,000 feet, August 7 (Cole), [Cole].

THEREVA BAKERI, new species.

Plate 12, fig. 163.

Male.—Length 7.5 to 8.5 mm. In general appearance somewhat similar to *fucata* Loew. Frons yellowish gray pollinose, with black pile above, yellow pile on the lower part. Face gray pollinose, the sides with black pile down to the cheeks, the central portion yellow pilose. Occiput gray pollinose, with black bristles and yellow pile. First two antennal joints and base of the third yellowish red, most of the third joint and the style brown. A few yellow pile on basal part of first antennal joint, the rest of the antennal pile rather long, dense, and black. First antennal joint slender, slightly longer than the third.

Thorax gray pollinose, with three sharply defined dark-brown pollinose vittae, the middle stripe blackish brown, those on the sides abbreviated anteriorly and posteriorly. Pile of mesonotum mixed black and yellowish. Scutellum grayish brown, with yellowish pile and four black marginal bristles. Pleura gray pollinose, whitish pilose. Halteres yellowish, the knobs partly brown.

Abdomen largely reddish yellow; dorsum of the first segment black, gray pollinose; second to fifth segments with basal black triangles, narrower on the fourth and fifth. Most of the abdominal pile yellowish, with black pile on the black triangles, upper part of the fifth and sixth segments, and the genitalia. Pile of the hypandrium long and yellow, dense on the projections. Basal portion of femora blackish, the black color more extended on the hind pair; pile of the femora mixed black and yellow. Bristles of the legs black. Costal cell and veins at base of wing yellowish, the other veins black; most of the wing marked with dark gray or smoky brown clouds, the intervals whitish (fig. 163); cell second M and first A largely hyaline; cell M–3 open in the margin.

Female.—Length 10 mm. Closely resembles the male. In the specimen described the third antennal joint is yellowish. Frons distinctly convex, the heart-shaped shining callosity reaching to the ocellar tubercle, a few black pile just below it and on the vertex, the rest of the pile of the frons and face yellow. Frons yellow pollinose, the face grayish white. Except for the black tuft below the eye, the pile of the cheeks and lower occiput white, that on the upper occiput yellow; bristles of the occiput black.

Pile of thorax shorter than in the male, the lateral vittae pale brown and more indistinct; pile of the lateral margins of the mesonotum golden yellow. First abdominal segment almost entirely yellow, all the other segments with black anterior margins, the pile on the black portions black, on the yellow portions of the first two segments yellow; the rest of the abdominal pile black and longer than usual. Most of the coxae and femora, tibiae except the apices, base of the first two tarsal joints yellowish, the last tarsal joints brown. The portions of the wing whitish in the male are grayish hyaline or with a yellowish tinge, the costal cell gray.

Type locality.—Mountains near Claremont and at Claremont, California (C. F. Baker).

Type.—Male, No. 25945, U.S.N.M.; allotype, female, same.

Specimens examined.—Three males, one female.

Paratypes.—There are two paratypes, one was collected at East Highlands, San Bernardino County, California, September 14 (F. R. Cole), [Cole]; the other specimen was taken in Santa Clara County, California (Harkins), [Stanford Univ.].

THEREVA FLAVIPILOSA, new species.

Plate 11, fig. 136.

Male.—Length 8.5 mm. Head black, the face, frons, and occiput whitish pollinose. Pile of vertex, top of frons, and outer margin of face black, the rest of the pile of the head deep yellow. Antennae small, black, the third joint about the length of the first, with the tip expanded (Fig. 136.) Pile of the head very dense.

Thorax, pleura, and scutellum black, thickly covered with erect yellow pile; mesonotum and scutellum shining; scutellum with a yellow pollinose border; two well-defined, widely separated yellow vittae on the mesonotum. Knobs of halteres brown, the stem yellow.

Abdomen black, some black pile on the dorsum of all the segments, including the genitalia, the larger part of the pile long and yellow; posterior margins of segments two to six yellow, yellowish pollinose, the color expanding and more shining on the sides. Upper lamellae of genitalia brown, the hypandrium brown at base, otherwise reddish

yellow and long yellow pilose. Venter almost entirely yellow, the segments narrowly black at the base. Basal two-thirds of femora, tip of tibiae, and two basal joints of tarsi black, other parts of the legs yellowish; front femora with black and yellow pile below, the two hind pairs with only yellow pile, largely reclinate. Wings gray hyaline, R–4 distinctly curved, cell M–3 closed before the margin; a faint gray cloud on the anterior cross vein; stigma yellowish brown.

Type locality.—Huntington Lake, Fresno County, 7,000 feet, July 26, 1919 (E. P. Van Duzee).

Type.—Male, in the California Academy of Sciences.

THEREVA BOREALIS, new species.

Female.—Length 11 mm. Head black; upper half of frons brownish pollinose, the lower part and face silvery white; a few short black hairs on the upper part and above the antennae; pile of face very short, white; cheeks and occiput white pollinose and pilose, the bristles on latter black. Antennae short, black, the first joint about as long as the third, gray pollinose, with white pile basally and a few apical black bristles.

Thorax black, mesonotum gray pollinose, with two distinct whitish vittae on the blackish gray dorsum. Scutellum, pleura, and coxae black, gray pollinose, white pilose. Mesonotum with mixed short black and white pile. Halteres yellowish at base and tip, base of knob blackish, the knob gray pollinose.

Abdomen black, largely shining black; first segment gray pollinose, with narrow silvery gray posterior margins on the second and third segments; fifth and sixth silvery gray pollinose except the base. Venter gray pollinose. Pile of abdomen short and sparse, white and reclinate on the first three segments, black and erect on the others. Femora black, very short silvery white pilose; front tibiae except base and the tarsi blackish; base of the front tibiae, most of the four hind tibiae, and base of tarsi yellowish. Bristles of the legs black. Wings hyaline, the veins and stigma brown and very narrowly bordered pale brown; cell M–3 broadly open in the margin.

Type locality.—Michigan Agricultural College, May 9, 1901.

Type.—Female, in the Cornell University collection.

THEREVA NITORIS Coquillett.

1894. *Thereva nitoris* COQUILLETT, Journ. N. Y. Ent. Soc., vol. 2, p. 101.

The unique female type is the only specimen known. The species is evidently related to the new form described above.

Type locality.—Missouri.

Type.—Female, No. 993, U.S.N.M.

THEREVA BOLBOCERA Osten Sacken.

1887. *Thereva bolbocera* OSTEN SACKEN, Biol. Centr. Amer., Dipt., vol. 1, p. 162.

The third antennal joint is onion-shaped, the frons with a pair of velvety black spots; the wings are described as densely variegated with spots. Judging from the description the antennae are like those figured for *T. novella* on plate 11. The species may prove to be a *Psilocephala* related to *tergissa* and *acuta*.

Type locality.—Presidio, Mexico.

Type.—In the British Museum.

THEREVA CRASSICORNIS Bellardi.

1861. *Thereva crassicornis* BELLARDI, Saggio di Ditterol. Messic., vol. 2, p. 88.

This species has not been reported since described from Mexico. It is a black, yellow marked species. The first antennal joint is described as very long, thick, inflated in the middle, as in *Dialineura*, species. The legs and abdominal markings are as in *T. fucata* Loew, but no mention is made of markings on the wings.

Type locality.—"Mexico."

Type.—In the Bellardi collection, Turin, Italy.

THEREVA RUFICORNIS Macquart.

1840. *Thereva ruficornis* MACQUART, Dipt. Exot., vol. 2, p. 25.

The following is a translation of the original description:

Black; antennae rufous; apex of abdomen rufous; wings hyaline, the spots fuscous; length 3.1; male.

Face and anterior part of frons black; antennae—the two first joints reddish, the third missing; abdomen—seventh segment and sexual organs reddish; anterior legs reddish brown, tarsi brown, the others are missing; halteres black; wings hyaline; base and exterior border yellowish, veins brown, a small spot of brown at the base of second submarginal and posterior cell.

This species which is placed by the side of the preceding in the collection of the Museum, closely resembles that species and is perhaps a variety of it, yet the differences which distinguish the two are possibly specific.

Carolina. Museum.

Type.—Presumably in the museum, Lille, France.

This species, *Thereva nigra* Say, and the following three species described by Walker, I have not been able to recognize in any of the material examined; no doubt these forms are known under other names. Walker's types are in the British Museum and will in time be redescribed and the synonymy worked out; it is therefore well to give the original descriptions, as they are not easily available. The species are not included in the table of species as this would only cause confusion. Major Austin has kindly furnished notes on the types. Three of the species described in the genus *Thereva* belong

to the genus *Psilocephala*. Owing to the poor condition of the types two of the species given below could not be assigned to the genus *Thereva* with certainty.

THEREVA VARIA Walker.

1848. *Thereva varia* WALKER, List Dipt. Brit. Mus., vol. 1, p. 221.

The original description is as follows:

Female.—Fusca, subtus cinerea abdomine fulvo facsiis canis, antennis canis apicis nigris, pedibus fulvis, femorum tibiarum tarsorumque apicibus nigris, alis subcinereis.

Head black and clothed with black hairs, hoary with a tawny tinge in front, thickly clothed with white hairs beneath; feelers hoary with a very slight tawny tinge, black at the tips; mouth black, and clothed with black hairs; chest brown, with yellow hairs; breast gray, with hairs of the same color; abdomen very dark tawny, covered with a white bloom, and clothed with white hairs; fore borders of the segments hoary; underside gray, with a tawny spot on each side of every segment; legs tawny, clothed sparingly with black bristles; tips of the thighs, of the shanks, and of the joints of the feet black; wings slightly gray, darker and with a brownish tinge along the fore border; brands brown; veins piceous; cross veins bordered with brown; poisers tawny, with piceous knobs. Length of the body 3 lines, of the wings 6 lines.

a. Florida. Presented by E. Doubleday, Esq.

Major Austin adds the following notes from the type in the British Museum:

Antennae and one front leg missing, type otherwise in fairly good condition; sides of face hairy; fourth posterior cell widely open. Owing to the absence of the antennae, I am unable to say whether this species is a true *Thereva* in the present-day sense.

THEREVA NERVOSA Walker.

1848. *Thereva nervosa* WALKER, List Brit. Mus., vol. 1, p. 223.

Walker's original description is as follows:

Male.—Niger, abdomine piceo basi subtus ferrugineo, antennis pedibusque fulvis, femoribus cinereis, alis subcinereis, venis fusco marginatis.

Head and chest black; head clothed with black hairs above, and more thickly with white hairs beneath; feelers tawny; first joint very long and thick, and clothed with long black hairs; breast thinly clothed with long white hairs; abdomen piceous, ferruginous beneath toward the base; legs thinly clothed with black bristles and short black hairs; hips and thighs gray; shanks and feet tawny; tips of the feet joints piceous; wings slightly gray, especially at the tips and along the fore borders; brands and veins brown; cross veins bordered with the same color; poisers tawny, with brown knobs. Length of the body 4 lines, of the wings 8 lines.

a. Georgia. From Mr. Abbot's collection.

Major Austin gives the following notes from the type in the British Museum:

Type in very bad condition, greasy and entirely discolored; only three legs, all without terminal joints of tarsi; eyes narrowly separated above. I am unable to say to what genus this species should be assigned.

THEREVA SENEX Walker.

1848. *Thereva senex* WALKER, List Dipt. Brit. Mus., vol. 1, p. 224.

The original description by Walker is as follows:

Female.—Cinerea, capite pectoreque canis, abdomine fasciis ferrugineis, basi piceo, sigmenti 2[i] margine postico cano, antennis pedibusque cinereis, tibiis fulvis, tarsis piceis basi fulvis, alis limpidis.

Head hoary, thickly clothed with white hairs, dark brown between the eyes, behind which there are two or three rows of black bristles; eyes and eyelets red; feelers gray; the first joint furnished with black bristles; mouth piceous: chest gray, thinly clothed with short yellow hairs, and having a few black bristles on each side; breast hoary, more thickly clothed with long white hairs: abdomen gray, clothed with short yellow hairs, which are most thick at the sides of the segments at the base; hind borders of the segments ferruginous; first segment piceous; hind border of second segment hoary; hips and thighs gray, the former thickly clothed with long white hairs, the latter more thinly furnished with short yellow hairs, and having also a few black short bristles; tips of thighs tawny; shanks tawny, with piceous tips, beset with very small black hairs and long black bristles: feet piceous, clothed with short black hairs, and having also black bristles at the tip of each joint; first and second joints tawny, excepting their tips; wings colorless; brands tawny, very narrow; veins tawny along the fore borders, piceous along the hind borders; poisers tawny, piceous toward the tips of the stalks; knobs yellow. Length of the body 5 lines, of the wings 8 lines.

a. Nova Scotia. From Lieutenant Redman's collection.

Major Austin notes that the type in the British Museum is in fairly good condition and that the species is apparently a true *Thereva.*

THEREVA NIGRA Say.

1823. *Thereva nigra* SAY, Journ. Acad. Nat. Sci. Phila., vol. 3, p. 40.
1882. *Psilocephala nigra* VAN DER WULP, Tijd. v. Ent., vol. 25, p. 118.

Say's original description is as follows:

Black, incisures and lateral spot on the fifth segment gray.

Inhabits Pennsylvania.

Head glabrous, polished; hypostoma and all beneath with gray minute hair; antennae with minute gray hair, and longer sparse black hair on the basal joint; occiput velvet black; wings pellucid, stigmata and nervures brown, costal edge beyond the stigma pale, each of the two ultimate pairs of nervures uniting before they attain the edge of the wing; poisers brown; scapus pale; pleura, pectus, and coxae somewhat glaucous; feet blackish, tibiae and tarsi excepting at tip pale, anterior tibia at tip and tarsi blackish; tergum polished, posterior edges of the third or fourth basal segments gray, spot each side of the fifth segment oblong-oval oblique.

Length 0.3 of an inch (about 8 mm.).

The type is destroyed and it is probable that the identity of this species will never be known. Coquillett considered it a true *Thereva,* and various species of *Psilocephala* and *Thereva* have been placed under the name by other dipterists. The description sounds like a *Psilocephala* related to *haemorrhoidalis* and prehaps Kröber is correct in his supposition that Say had before him what we now know as *Psilocephala haemorrhoidalis* when he described this species.

Kröber redescribes *Thereva nigra* Say in his 1914 paper. He holds that *T. melanoneura* Loew is identical with *T. nigra* and describes that species for *nigra*. There were five males and one female in the material, from Colorado and Flagstaff, Arizona. The writer has stated above that Say's description of *nigra* is unrecognizable. It is certainly not *melanoneura*, which is typically a southwestern species and at the time that Say was describing diptera this region was Indian country and practically unexplored.

Two of the species described by Kröber in 1914 are redescribed by the writer in the foregoing pages; one of these species, *T. bella*, was kindly determined by C. W. Johnson, the other, *T. niveipennis*, was originally described as a new species. Translations of the descriptions of the four other species of *Thereva* are given below.

THEREVA NIVEA Kröber.

1914. *Thereva nivea* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 64.

Male.—Length 9 mm. Very near *T. semitaria* Coquillett. Dense snow white pilose, without silvery reflections. The mesonotum and antennae are as in *T. semitaria*. The halteres are almost white. The legs are wholly pale yellowish brown, the femora thick white pilose. The anal segment is reddish yellow. The wings are tinged pale yellowish brown, the stigma not apparent.

Type locality.—Mesilla Valley, New Mexico, April 19.

Type.—In the United States National Museum, Cat. No. 26028.

THEREVA METALLICA Kröber.

1914. *Thereva metallica* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 68.

Male.—Length 8 mm. A species with long wooly white pile. The head is strongly metallic, white, shining, only the frontal triangle itself shining black. The pile of the face is unusually long, blackish brown, the face with very long snow white pile. The first antennal joint is very long bristled, above with black, below with white bristles; second and third antennal joints more reddish, gray tomentose. The occiput is gray, on the eye margin silvery white.

The mesonotum is black in ground color, dull, with two whitish gray, narrow longitudinal vittae. The scutellum is black, gray dusted. The pile of the mesonotum is unusually long, sparse, erect, snow white. The pleura are so thickly white pilose that the ground color is not visible. The abdomen, viewed from in front, is pure metallic silvery white, with an intense glitter, as with no other species; the pile is long, snow white, sparse. The anal lamellae are reddish yellow. The borders of the tergites are not visible. The venter is black, sparsely gray dusted, the second segment with a whitish border; the pile is long, sparse, white. The halteres are black.

The femora are black, with long but sparse white pile; the tibiae and tarsi are pale yellowish brown, the apices hardly darkened at all. The wings are pure hyaline, the stigma brownish, the veins thin and the upper fork of the third vein turned upward.

Type locality.—Las Vegas Hot Springs, New Mexico, May 17.

Type.—In the United States National Museum, Cat. No. 26029.

THEREVA CONCAVIFRONS Kröber.

1914. *Thereva concavifrons* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 70.

Female.—Length 12 mm. The head is almost golden yellow tomentose, the face becoming whitish, the vertex merging to brownish; between the two colors is a dull black band which reaches from one eye to the other, slightly bulging and quite far from the ocelli; in certain lighting it disappears; in this case below the lowest ocellus a similar band appears, which however is far from the eye margin. This band is the margin of a quite noticeable frontal concavity. The first antennal joint is black, gray tomentose, the second with a brownish tone, the third pure brown, reddish at the base.

The mesonotum is brownish yellow tomentose, with thick close-lying, golden yellow, almost wooly pile. The scutellum appears to be reddish, with tomentum and pile like the thorax. The mesonotum has two faint stripes and a brown median vitta. The pleura are light gray, very sparsely brassy yellow pilose. The halteres are brownish, with a reddish yellow stem.

The abdomen is shining reddish yellow, the second to the fifth tergites with more or less rounded off, shining black anterior marginal spots. The venter is plain reddish yellow, the second to the fourth segments with faint, silky borders as on the upper side. The legs are wholly reddish yellow, the tarsi hardly darkened at all. The wings are tinged pale brownish, the veins noticeably bordered, the stigma very faint.

Type locality.—Rio Ruidoso, New Mexico.

Type.—In the United States National Museum, Cat. No. 26026.

THEREVA FLAVOHIRTA Kröber.

1914. *Thereva flavohirta* KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 70.

Female.—Length 12.5 mm. Very near *T. flavicauda* Coquillett and *duplicis* Coquillett. The antennae are wholly pale yellowish red. The callosity consists of two shining black, quite convex spots. The pile of the antennae and the face pale reddish yellow.

The mesonotum is sparsely grayish yellow pilose. The legs are wholly pale yellowish red, the last tarsal joint scarcely darkened. Abdomen on the first to the fourth segment largely blackish gray.

with broad, reddish yellow posterior margins; the following segments are largely shining reddish yellow, more or less blackish at the bases; the pile of the abdomen is light reddish yellow.

The halteres are pale reddish yellow. The wings are tinged deep yellowish, the veins strong, partly, especially on the fork of the third vein, blackish. The stigma of the wing is not plain.

Type locality.—Colorado.

Type.—In the United States National Museum, Cat. No. 26027.

REFERENCES TO LITERATURE ON NORTH AMERICAN THEREVIDAE.

1821. WIEDEMANN, Dipt. exot., pp. 112–114 (two species described from Georgia).
1823. SAY, Journ. Acad. Nat. Sci. Phila., vol. 3, pp. 39–40 (description of *Thereva nigra*).
1824. SAY, Long's Exped. to St. Peter's River, vol. 2, Append., p. 370 (description of *Thereva frontalis*).
1828. WIEDEMANN, Auszereurop. zweifl. Ins., vol. 1, pp. 235–236 (notes on North American species).
1829. SAY, Journ. Acad. Nat. Sci. Phila., vol. 6, p. 156 (description of *Thereva albifrons*).
1840. MACQUART, Dipt. exot., vol. 2, pt. 1, pp. 24–26 (description of *Thereva rufi-cornis* and *T. haemorrhoidalis*).
1848. WALKER, List Dipt. Brit. Mus., vol. 1, pp. 221–224 (six species of *Thereva* are described, three really belonging to *Psilocephala*).
1852. WALKER, Insecta Saunders., Dipt., vol. 1, p. 197 (description of *Tabuda fulvipes*).
1861. BELLARDI, Saggio di Ditterol. Messic., vol. 2, pp. 88–92 (four species are described from Mexico).
1862. EVETT, Proc. Ent. Soc. Phila., vol. 1, p. 217 (record of *Tabuda fulvipes*).
1867. SCHINER, Reise der Novara, Dipt., pp. 145–146 (remarks on the genera of the world and descriptions of several new species, none from North America).
1869. LOEW, Berlin. Ent. Zeitschr., vol. 13, pp. 7–12 (10 North American species described).
1869. LOEW, Berlin. Ent. Zeitschr., vol. 13, pp. 166–172 (four North American species described).
1872. LOEW, Berlin. Ent. Zeitschr., vol. 16, p. 74 (new species described).
1874. LOEW, Berlin. Ent. Zeitschr., vol. 18, p. 382 (*Thereva hirticeps* described).
1876. LOEW, Zeitschr. f. d. ges. Naturwiss., vol. 47, p. 319 (description of *Psilocephala laevigata*, *P. platancala*, and *Thereva melanophleba*).
1877. OSTEN SACKEN, Bull. U. S. Geol. Surv., vol. 3, p. 274 (description of *T. vialis* and notes on other western species).
1878. OSTEN SACKEN, Cat. Dipt. N. America, ed. 2, pp. 96 and 239 (lists the species and gives notes on Walker's species).
1886. WILLISTON, Trans. Amer. Ent. Soc., vol. 13, p. 294 (description of *Thereva crassicornis*).
1887. OSTEN SACKEN, Biol. Centr. Amer. Dipt., vol. 1, p. 162 (description of *T. bolbocera* and a list of the previously described species from Mexico).
1889. BIGOT, Ann. Ent. Soc. France, ser. 6, vol. 9, p. 321 (description of *Ozodicer omyia mexicana*).
1893. COQUILLETT, Can. Ent., vol. 25, pp. 197–201 (a synopsis of the genus *Thereva* with a table of species and descriptions of five new species).
1893. COQUILLETT, Can. Ent., vol. 25, pp. 222–229 (a synopsis of the genus *Psilocephala* with a table of species and descriptions of five new forms).

1894. COQUILLETT, Journ. New York Ent. Soc., vol. 2, pp. 97–101 ("A Revision of the Dipterous Family Therevidae." The genera *Metaphragma* and *Nebritus* are erected and six new species described in all).

1898. COQUILLETT, Journ. New York Ent. Soc., vol. 6, p. 187 (description of *Henicomyia hubbardi*).

1901. WILLISTON, Biol. Centr. Amer. Dipt., vol. 1, p. 297 (in the supplement notes on two species are given).

1902. JOHNSON, Can. Ent., vol. 34, p. 241 (description of *P. grandis*).

1903. ALDRICH, Catalogue Dipt. of N. America, pp. 246–249 (lists 6 genera and 71 species).

1903. ADAMS, Kans. Univ. Sci. Bull., vol. 2, p. 222 (description of *P. acuta*).

1904. ADAMS, Kans. Univ. Sci. Bull., vol. 2, pp. 443–444 (in a paper on new diptera three new Therevids are described).

1904. COQUILLETT, Proc. Ent. Soc. Wash., vol. 6, p. 91 (in a paper on Central American diptera describes *P. pruinosa*).

1904. COQUILLETT, Proc. Ent. Soc. Wash., vol. 6, p. 177 (in a paper on new diptera describes *P. aurantiaca*).

1904. COQUILLETT, Invertebr. Pac., vol. 1, p. 23 (in a list of Californian and Nevadan diptera by C. F. Baker *Thereva flavicauda* is described).

1908. WILLISTON, Manual of North American Diptera, pp. 205–207 (gives a general account of the family with a table of genera).

1909. COCKERELL, Bull. Amer. Mus. Nat. Hist., vol. 26, p. 10, and the same volume, p. 68 (descriptions of two fossil species of Therevidae).

1910. HYSLOP, Proc. Ent. Soc. Wash., vol. 12, p. 98 (notes on early stages of *Thereva egressa*).

1912. KRÖBER, Stett. Ent. Zeitg., vol. 73, pp. 209–272. A revision of the Therevidae of North America (tables of species for *Thereva* and *Psilocephala* and several new species described).

1912. FELT, New York State Mus. Bull., no. 155, p. 121 (larva and pupa of *P. melampodia* described).

1913. KRÖBER, Genera Insectorum, p. 148, 66 pages and 3 plates (the genera and species of the Therevidae of the world with tables and generic diagnoses).

1913. JOHNSON, Bull. Amer. Mus. Nat. Hist., vol. 32, art. 3, pp. 58–59 (in a list of the diptera of Florida records 13 Therevids, including *P. obscura* Coquillett).

1914. KRÖBER, Beiheft z. Jahrb. Hamb. Wiss. Anstalten, vol. 31, p. 64 (describes 14 new species from North America and gives notes an others).

1915. MALLOCH, Bull. Ill. Lab. Nat. Hist., vol. 11, p. 324 (notes on larva and pupa of *P. haemorrhoidalis*).

1917. MALLOCH, Bull. Ill. Lab Nat. Hist., vol. 12, pp. 296–398 (a short account of the family characters and biology).

1920. COCKERELL, Proc. U. S. National Museum, vol. 57, p. 251 (in a paper on fossil insects describes a new genus and species of Therevidae).

EXPLANATION OF PLATES.

All the figures were drawn by the author from specimens examined under the binocular microscope.

Plate 1.

Fig. 1.—*Caenotus inornatus*, new species. Antenna.
2.—*C. inornatus*, new species. Female.
3.—*C. inornatus*, new species. Genitalia of male.
4.—*C. minutus*, new species. Male.

Plate 2.

Fig. 5.—*Henicomyia hubbardi* Coquillett. Dorsal view of male.
6.—*H. hubbardi* Coquillett. Antenna.
7.—*H. hubbardi* Coquillett. Lateral view of male.

Plate 3.

Fig. 8.—*Nebritus pellucidus* Coquillett. Antenna.
9.—*N. pellucidus* Coquillett. Female.
10.—*N. pellucidus* Coquillett. Male genitalia.
11.—*Pherocera signatifrons*, new species. Antenna.
12.—*P. signatifrons*, new species. Female.
13.—*P. signatifrons*, new species. Head.
14.—*P. flavihalteralis*, new species. Front of head.
15.—*P. flavipes*, new species. Front of head.
16.—*Chromolepida bella*, new species. Front of head
17.—*C. bella*, new species. Antenna.
18.—*C. bella*, new species. Genitalia.

Plate 4.

Fig. 19.—*Epomyia rufiventris* (Loew.) Wing of female.
20.—*E. pictipennis* (Wiedemann). Front of head of female.
21.—*E. bella*, new species. Front of head of female.
22.—*E. pictipennis* (Wiedemann). Wing of female.
23.—*E. sumichrasti* (Bellardi). Wing of female.
24.—*E. sumichrasti* (Bellardi). Front of head of female.
25.—*E. rufiventris* (Loew). Front of head of female.
26.—*E. scutellaris* (Loew). Front of head of female.
27.—*E. bella*, new species. Wing of female.
28.—*E. pictipennis* (Wiedemann). Front and middle tibiae and tarsi.
29.—*E. scutellaris* (Loew). Wing of female.
30.—*E. scutellaris* (Loew). Antenna.
31.—*E. bella*, new species. Antenna.
32.—*E. sumichrasti* (Bellardi). Antenna.
33.—*E. sumichrasti* (Bellardi). Male genitalia.
34.—*E. pictipennis* (Wiedemann). Male genitalia.
35.—*E. scutellaris* (Loew). Male genitalia.
36.—*E. pictipennis* (Wiedemann). Antenna.
37.—*E. rufiventris* (Loew). Antenna.

PLATE 5.

Fig. 38.—*Psilocephala aldrichi* Coquillett. Female.
39.—*P. aldrichi* Coquillett. Male.

PLATE 6.

Fig. 40.—*Psilocephala morata* Coquillett. Female.
41.—*P. flavipennis*, new species. Female.
42.—*P. aldrichi* Coquillett. Female.
43.—*P. frontalis*, new species. Female.
44.—*P. platancala* Loew. Female.
45.—*P. placida* Coquillett. Female.
46.—*P. munda* Loew. Female.
47.—*P. haemorrhoidalis* (Macquart). Female.
48.—*P. haemorrhoidalis* (Macquart). Male.
49.—*P. limata* Coquillett. Female.
50.—*P. tergissa* (Say). Female.
51.—*P. pavida* Coquillett. Female.
52.—*P. aurantiaea* Coquillett. Female.
53.—*P. canadensis*, new species.
54.—*P. melampodia* Loew. Female.
55.—*P. laevigata* Loew. Female.
56.—*P. marcida* Coquillett. Female.
57.—*P. acuta* Adams. Female (from cotype).
58.—*P. arizonensis*, new species. Female.
59.—*P. variegata flavipilosa*, new subspecies. Female.
60.—*P. cinerea*, new species.
61.—*P. latifrons*, new species. Male.
62.—*P. lateralis* Adams. Female.
63.—*P. costalis* Loew. Female.
64.—*P. argentifrons*, new species. Male.
65.—*P. fuscipennis*, new species. Female.

PLATE 7.

FIG. 66.—*Psilocephala tergissa* (Say).
67.—*P. acuta* Adams.
68.—*P. festina* Coquillett.
69.—*P. flavipennis*, new species.
70.—*P. aurantiaca* Coquillett.
71.—*P. limata* Coquillett.
72.—*P. cinerea*, new species.
73.—*P. munda* Loew.
74.—*P. costalis* Loew.
75.—*P. notata* (Wiedemann).
76.—*P. platancala* Loew.
77.—*P. pavida* Coquillett.
78.—*P. variegata occidentalis*, new subspecies.

PLATE 8.

FIG. 79.—*Psilocephala marcida* Coquillett. Antenna; 97, male genitalia.
80.—*P. variegata flavipilosa*, new subspecies. Antenna.
81.—*P. munda* Loew. Antenna; 96, male genitalia.
82.—*P. festina* Coquillett. Antenna; 106, male genitalia.
83.—*P. morata* Coquillett. Antenna; 105, male genitalia.

FIG. 84.—*P. pavida* Coquillett. Antenna; 98, male genitalia.
85.—*P. notata* (Wiedemann). Antenna.
86.—*P. limata* Coquillett. Antenna; 101, male genitalia.
87.—*P. acuta* Adams. Antenna.
88.—*P. baccata* Coquillett. Antenna.
89.—*P. melampodia* Loew. Antenna.
90.—*P. platancala* Loew. Antenna.
91.—*P. aurantiaca* Coquillett. Antenna.
92.—*P. pollinosa*, new species. Antenna.
93.—*P. signatipennis*, new species. Antenna.
94.—*P. argentifrons*, new species. Antenna.
95.—*P. cinerea*, new species. Antenna.
96.—*P. munda* Loew. Male genitalia.
97.—*P. marcida* Coquillett. Male genitalia, lateral and ventral views.
98.—*P. pavida* Coquillett. Male genitalia.
99.—*P. costalis* Loew. Male genitalia.
100.—*P. argentifrons*, new species. Male genitalia.
101.—*P. limata* Coquillett. Male genitalia.
102.—*P. variegata occidentalis*, new subspecies. Male genitalia.
103.—*P. signatipennis*, new species. Male genitalia.
104.—*P. aurantiaca* Coquillett. Male genitalia.
105.—*P. morata* Coquillett. Male genitalia.
106.—*P. festina* Coquillett. Male genitalia.
107.—*P. flavipennis*, new species. Male genitalia.

PLATE 9.

FIG. 108.—*Dialineura melanophleba* (Loew). Wing.
109.—*D. crassicornis* (Williston). Male.
110.—*D. crassicornis* (Williston). Genitalia.
111.—*D. melanophleba* (Loew). Male genitalia.
112.—*D. melanophleba* (Loew). Head of male (higher magnification than 113 and 114).
113.—*Tabuda fulvipes* Walker. Head of male.
114.—*T. borealis*, new species. Head of male.
115.—*T. fulvipes* Walker. Male genitalia.
116.—*T. borealis*, new species. Male genitalia.
117.—*T. fulvipes* Walker. Wing.

PLATE 10.

All figures other than 118 show the female head from above.

FIG. 118.—*Metaphragma planiceps* (Loew). Male.
119.—*Thereva johnsoni* Coquillett.
120.—*T. brunnea*, new species.
121.—*T. frontalis* Say
122.—*T. duplicis* Coquillett.
123.—*T. vanduzeei*, new species.
124.—*T. otiosa* Coquillett.
125.—*T. melanoneura* Loew.
126.—*T. hirticeps* Loew.
127.—*T. pygmaea*, new species.
128.—*T. semitaria* Coquillett.
129.—*T. vialis* Osten Sacken.
130.—*T. candidata* Loew.
131.—*T. comata* Loew.

PLATE 11.

FIG. 132.—*Thereva pseudoculata*, new species. Antenna.
133.—*T. pacifica*, new species. Antenna.
134.—*T. niveipennis* Kröber. Antenna.
135.—*T. vanduzeei*, new species. Antenna.
136.—*T. flavipilosa*, new species. Antenna.
137.—*T. bella* Kröber. Antenna.
138.—*T. semitaria* Coquillett. Antenna.
139.—*T. novella* Coquillett. Antenna.
140.—*T. vialis* Osten Sacken. Antenna.
141.—*T. otiosa* Coquillett. Antenna.
142.—*T. johnsoni* Coquillett. Antenna.
143.—*T. pygmaea*, new species. Antenna.
144.—*T. pygmaea*, new species. Male genitalia.
145.—*T. melanoneura* Loew. Male genitalia.
146.—*T. cockerelli*, new species. Male genitalia.
147.—*T. vialis* Osten Sacken. Male genitalia.
148.—*T. duplicis* Coquillett. Male genetalia.
149.—*T. candidata* Loew. Male genetalia.
150.—*T. frontalis* Say. Male genitalia.
151.—*T. comata* Loew. Male genitalia.
152.—*T. brunnea*, new species. Male genitalia.
153.—*T. pseudoculata*, new species. Male genitalia.
154.—*T. fucata* Loew. Male genitalia.
155.—*T. cingulata* Kröber. Male genitalia.

PLATE 12.

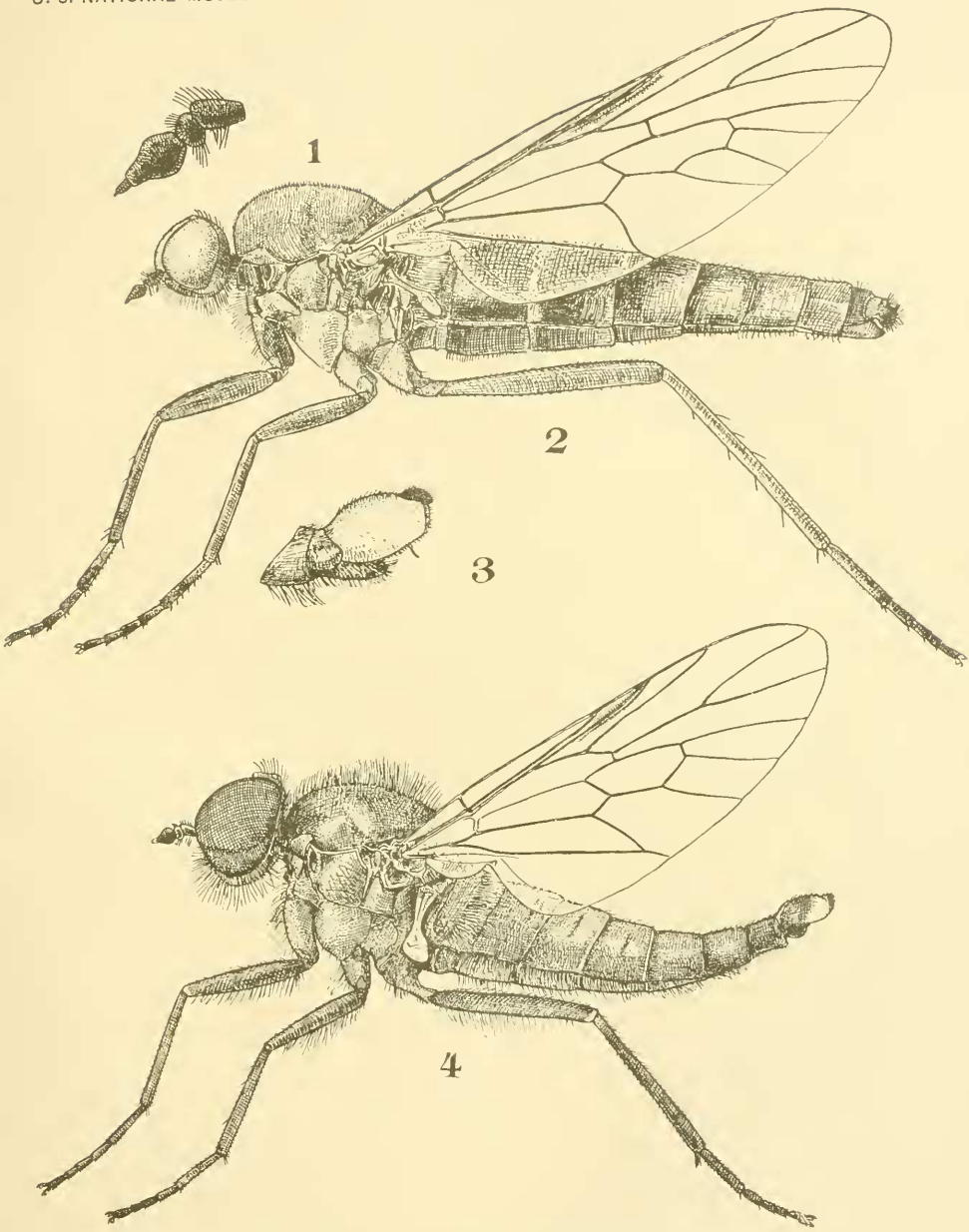
Wings of various species of *Thereva*.

FIG. 156.—*Thereva melanoneura* Loew.
157.—*T. vanduzeei*, new species.
158.—*T. vialis* Osten Sacken.
159.—*T. duplicis* Coquillett.
160.—*T. niveipennis* Kröber.
161.—*T. comata* Loew.
162.—*T. fucata* Loew.
163.—*T. bakeri*, new species.
164.—*T. brunnea*, new species.
165.—*T. pygmaea*, new species.
166.—*T. hirticeps* Loew.
167.—*T. otiosa* Coquillett.

PLATE 13.

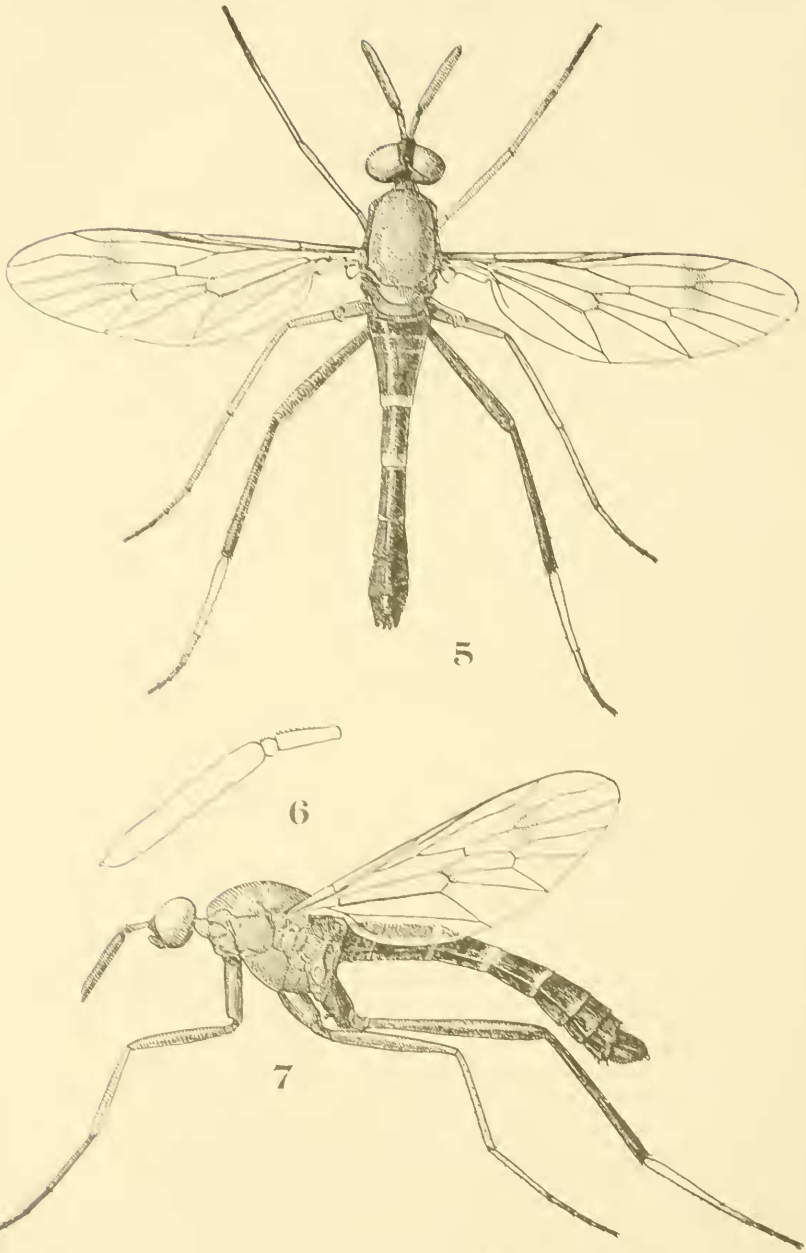
Early stages of Therevidae.

Fig. 168.—Larva of *Psilocephala frontalis*, new species.
169.—Head and prothorax of same, greatly enlarged.
170.—Pupa of *P. frontalis*.
171.—Anterior part of pupa of *P. haemorrhoidalis* (Macquart), showing split made by emerging adult.
172.—Posterior portion of same, showing the arrangement of spines.
173.—Pupa of *Psilocephala limata* Coquillett.
174.—Pupa of *P. argentifrons*, new species.



NORTH AMERICAN FLIES OF THE FAMILY THERIVIDAE.

FOR EXPLANATION OF PLATE SEE PAGE 135.



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